

# *OUR EYES*

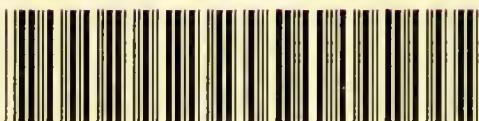
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# OUR EYES

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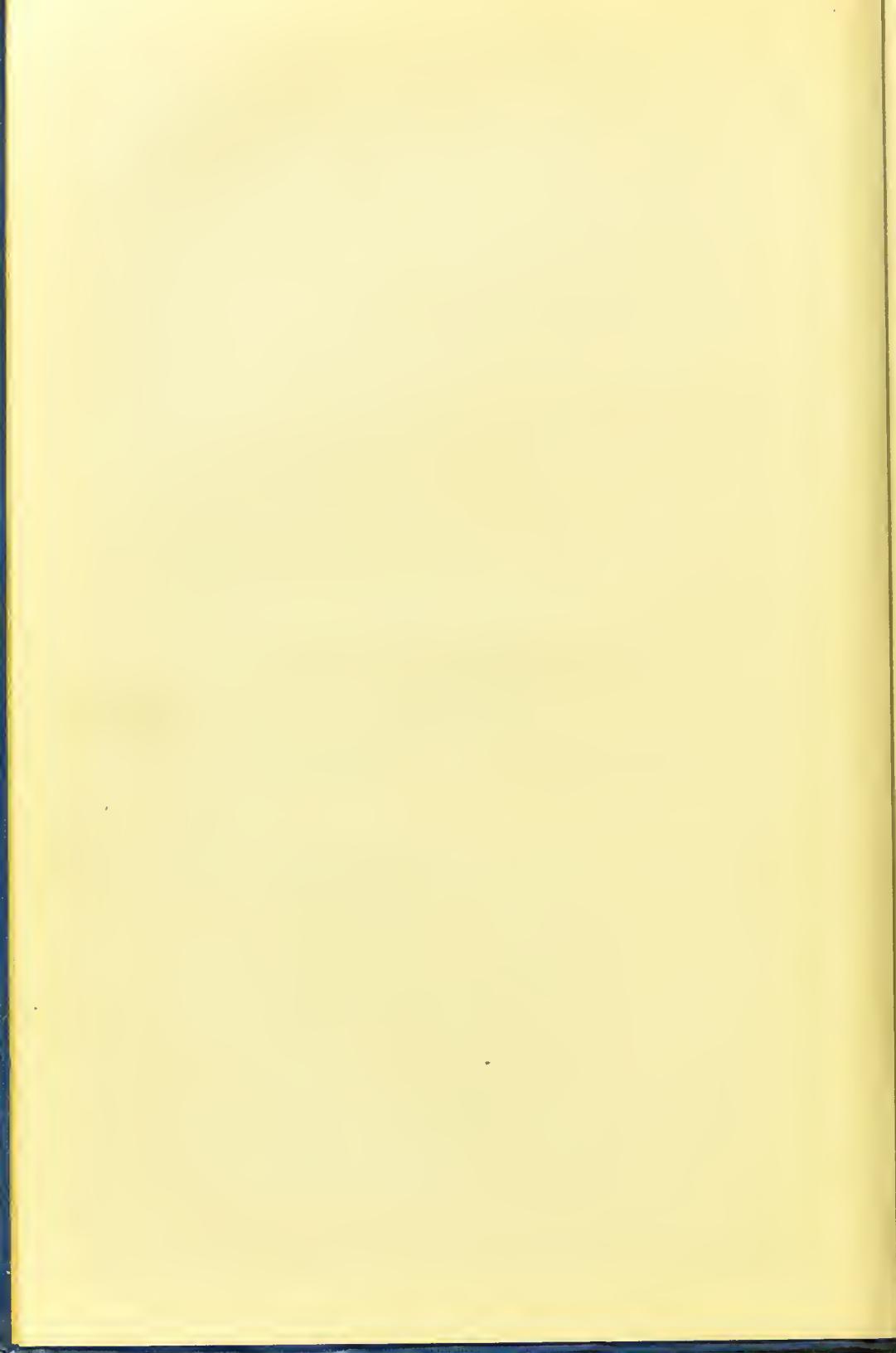
MY ESTEEMED FRIEND,

DR. BENJAMIN WARD RICHARDSON,

M.A., M.D., LL.D., F.R.S., ETC., ETC.,

WHOSE NOBLE LIFE HAS BEEN PASSED IN  
ALLEVIATING THE SUFFERING OF MAN AND HIS DUMB  
FELLOW-CREATURES,

THIS LITTLE BOOK IS DEDICATED.



## PREFACE TO THE THIRD EDITION

IN writing this little book, my endeavour has been to set down, *in the simplest words I could find that would express my meaning*, the results of the experience I have gained in the construction and adaptation of spectacles during the last thirty years.

The first edition was sold in two or three weeks, and to my regret the publishers had to issue a second edition without alteration. This second edition is also now exhausted.

The press generally has noticed the book so favourably that I have been encouraged to revise it carefully, and make great additions to it, as well as to considerably increase the number of the illustrations.

I trust these alterations will make the book more valuable, and that an equally favourable reception will be accorded to this new edition.

JOHN BROWNING.

*November, 1884.*

## PREFACE TO THE SEVENTH EDITION.

SIX editions having now been rapidly called for, and the book having been for some time out of print, the SEVENTH edition has been in great part rewritten. As compared with the first edition it contains almost twice the amount of matter, and nearly double the number of engravings, yet, thanks to the enterprise of my publishers, the price has not been increased. The information respecting Short-Sight and Astigmatism has been much extended, and several new chapters added—among others, on Complaints of the Eye, on the Care of the Eyes in Riding or Driving, and on Ladies' Veils.

My sincere thanks are specially due to the numerous members of the medical profession who have consulted me themselves, and kindly recommended the previous editions of this book.

J. B.

35, ALFRED PLACE WEST,  
SOUTH KENSINGTON, S.W.  
*January, 1889.*

## C O N T E N T S.

	PAGE
<b>INTRODUCTION—ON THE ART OF SEEING .. . . .</b>	<b>15</b>
The almost Solid Appearance of Photographs, p. 15.—Importance of Spectacles, p. 16.	
<b>DESCRIPTION OF THE HUMAN EYE .. . . .</b>	<b>16</b>
A simple Working Model of the Eye, p. 18.—Reading with the Book Upside-down, p. 18.—Is Seeing Believing? p. 19.—An Insensitive Part of the Retina, p. 19.—The Eye takes a Photo- graph of every Object it looks at, p. 19.	
<b>A FEW WORDS ABOUT LIGHT .. . . .</b>	<b>20</b>
Light the Cause of all Colour, p. 20.—Proof of the above Asser- tion, p. 20.	
<b>COLOUR-BLINDNESS .. . . .</b>	<b>20</b>
Number of Persons who are Colour-blind, p. 20.—Instance of Colour-blindness, p. 20.—Importance of testing Sailors, Engine- drivers, and Guards for Colour-blindness, p. 21.—A Spectroscope for detecting Colour-blindness, p. 21.	
<b>COMPLEMENTARY COLOURS .. . . .</b>	<b>21</b>
How Complementary Colours are produced, p. 21.—Three Ways of mixing Colours, p. 22.—The Colour-Top, p. 22—Impure Colours, p. 23.—Use of the Spectroscope for detecting Blood, p. 23.	
<b>HOW TO PRESERVE OUR EYESIGHT .. . . .</b>	<b>24</b>
How to look through a Microscope, p. 24.—How to look through a Telescope, p. 25.—To adjust a Bright Lamp Flame, p. 25.	
<b>HOW TO READ BY LAMPLIGHT .. . . .</b>	<b>25</b>
The Importance of Position with regard to the Lamp, p. 26.— Reading by Firelight, p. 29.	
<b>GENERAL CARE OF THE EYES .. . . .</b>	<b>30</b>
The Value of Tinted Writing-Papers, p. 30.—The Use of the Type- Writer, p. 30.—Bad Effect of Wire-gauze Window-blinds, p. 31.	
<b>THE CARE OF INFANTS' AND CHILDREN'S EYES .. . .</b>	<b>31</b>
Exposing Children's Eyes to Sunlight, p. 31.—Effects of Deficient Light in Schools in producing Short-sightedness, p. 32.	
<b>THE USE OF COLOURED GLASSES .. . . .</b>	<b>32</b>
The Choice of Different Colours, p. 32.—Defects in Coloured Glass used for Optical Purposes, p. 32.—Coloured Glass Spectacles or Folders should be used at the Sea-side, p. 33.—For Reading, p. 34.	

	PAGE
WHEN SPECTACLES ARE REQUIRED .....	34
The Age at which Spectacles become necessary, p. 35.—Bad Results of postponing the Use of Spectacles, p. 36.—“Bradshaw Blindness,” p. 36.—Proper width of Spectacles, p. 38.—Evil Effects of wearing Single Eye-glasses, p. 43.—Danger of wearing Reading Spectacles while Walking, p. 43.—Spectacles should be always of the Full Strength wanted to give Easy Vision without Strain, p. 44.—The Eyes frequently differ in Focus, p. 46.—Astigmatism seldom corrected, p. 47.	
BROWNING'S METHOD OF TESTING THE SIGHT .....	49
The Optometer, p. 49.—The Width-Measurer, p. 49.—The Short-sight Test-Lenses, p. 50.	
SHOT-PROOF SPECTACLES .....	52
OLD-SIGHT .....	53
Spectacles generally required at about 45 to 47 Years of Age, p. 53.—There is no Fixed Age at which they become Necessary, p. 53.—The Reason Spectacles are required, p. 54.—Diagrams showing the Use of Convex Lenses in Long-Sight, pp. 53, 54.	
THE BEST DISTANCE FOR READING .....	55
Supposed Superiority of Perisopic Lenses, p. 56.—Diagrams showing the Superiority of Double Convex Lenses, p. 57.—Spectacles with Stronger Lenses should be used to read at Night-time than are required by Daylight, p. 58.—Still Stronger Spectacles for very Minute Writing or Drawing, and for Reading excessively Small Print, p. 58.—Pebbles should be cut at Right Angles to the Axis of the Quartz Crystals, p. 59.	
LONG-SIGHT .....	61
Long-Sighted Persons cannot see Objects plainly, either close or distant, p. 61.	
SHORT-SIGHT .....	62
Short-Sight to some extent Hereditary, p. 62.—Often produced by Reading in an Imperfect Light when Young, p. 62.—Diagrams showing the Use of Concave Lenses in Short-Sight, pp. 62, 63.—Should never be neglected, p. 63.—Two Pairs of Spectacles required in Short-Sight: one for Walking or Riding, and one for Reading, p. 63.—Short-Sight does not always decrease with Age, p. 64.—The Use of a Binocular for saving the Eyesight, p. 68.	
TEST TYPES .....	68
A Simple Method of Testing the Eyesight to determine whether Spectacles are required, p. 68.	
HOW TO TEST THE SIGHT .....	70
Testing with Small Figures, p. 70.—The Distance at which People should read varies, p. 70.—Anecdote of an American Judge, p. 71.—Injury to the Sight caused by the Use of Improper Spectacles, p. 71.—Three Anecdotes of such Injury, p. 72.—Mistakes made in testing the Vision by so-called Opticians, p. 73.—The Responsibility of an Optician as regards Eyesight, p. 74.—Testing the Eyes both an Art and a Science, p. 74.—The Eye is not simply an Optical Instrument, but a Complex Physiological	

Organ, p. 74.—Peculiarities in the Eyes caused by Difference of Constitution, p. 74.—Persons who have, according to the usual Tests, the same Eyesight cannot always wear the same Spectacles, p. 74.—Dilating the Pupil of the Eye before Testing condemned, p. 75.—Instance of Mischief caused by Atropine and Belladonna, p. 75.—Spectacles which give the Clearest Vision are not always Suitable, p. 75.—An Oculist's Spectacles with which a Patient could not see, p. 75.	
ASTIGMATISM . . . . .	76
In Cases of Astigmatism Lines can be seen much plainer in one Direction than in another, p. 76.—Tests for the Detection of Weak or Slight Astigmatism, p. 76.—Browning's very Delicate Test for Astigmatism, p. 78.—Can be detected by means of a Clock-Dial, p. 80.—How it can be corrected, p. 80.	
IRREGULAR ASTIGMATISM . . . . .	81
SPECTACLES AND FOLDERS COMPARED . . . . .	81
Comparative Advantages and Disadvantages, p. 81.—Folders not likely to be mislaid or lost, p. 82.—Folders more easily removed, p. 82.—Not so frequently worn when unnecessary, p. 82.—The Use of Folders greatly on the increase, p. 82.—Both can be used by the Same Person with Benefit, p. 82.	
NEW FORM OF FOLDERS . . . . .	83
The Value of Spring-Folders with Tinted Lenses for preserving the Eyes, p. 87.	
UNEQUAL VISION . . . . .	87
Method of Testing by the Optometer, p. 87.—The Best Means of Equalizing the Vision by Spectacles, p. 87.—The Full Correction of the Inequality not always Beneficial, p. 87.—The Correction may be gradually increased, p. 87.—A Case described, p. 88.—Curious Experiment with Unequal-sized Images in a Stereoscope, p. 89.—Experiment with Coloured Discs, p. 89.—Percentages of Unequal Vision determined at a Meeting of the British Association, p. 89.—The Left Eye generally the Weakest, p. 90.—Suiting the Sight from a Tray of Spectacles, p. 90.—Both Eyes are seldom the same, p. 90.—People having greatly Unequal Vision seldom suspect it, p. 90.—Remarkable Cases of Unequal Vision, p. 90.—Injurious Results of Unequal Vision when not properly corrected, p. 90.	
UNSYMMETRICAL FEATURES . . . . .	91
Necessity of making the Spectacles to fit the Face when there is any Want of Symmetry in the Features, p. 91.—Want of Symmetry in the Features much less noticeable when the Spectacles are made to conform to them, p. 91.—An Instance, p. 91.	
SPECTACLES WITH INACCURATE LENSES . . . . .	92
Spectacles Glazed with the Lenses of Different Focus when they should have been Alike, p. 92.—A Case described, p. 92.—Most Low-class Spectacles have Inaccurate Lenses, p. 93.	
FRANKLIN'S SPECTACLES . . . . .	94
Spectacles with Divided Lenses, p. 94.—Their Use, p. 94.—Of great Advantage, especially to Artists, p. 95.	

	PAGE
ARTISTS' SPECTACLES .....	95
Artists' Work deteriorates after Middle Age for Want of Proper Spectacles, p. 95.	
HOW TO PUT ON SPECTACLES OR SPRING-FOLDERS .....	96
Best Position for Spectacles for Reading, Drawing, or Needlework, p. 96.—Reason why they must be taken off when walking, p. 96. —Spectacles and Folders are usually worn with the Lens for the Right Eye lowest on the Face, p. 96.	
THE CARE OF SPECTACLES .....	97
How Spectacles are Ill-used, p. 97.—Those who have used Spectacles which have been bent, cannot see at first through Spectacles which are quite symmetrical, p. 98.—Gold Spectacles can be kept in Shape best, and repaired the easiest, and are the Cheapest Wear in the End, p. 98.—How to clean Spectacle Lenses, p. 98. —Spectacles should be carried in Rigid Cases, p. 98.	
SINGLE EYE-GLASSES .....	99
Using Single Eye-Glasses prejudicial to the Sight, p. 99.—Leads to the Suppression of the Vision with One Eye, the Definition of which becomes impaired, p. 99.	
INVISIBLE SPECTACLES .....	99
Best Form described with Invisible Frames, p. 99.—The Mischief wrought by using instead <i>Frameless</i> Spectacles and Folders, p. 99.—Mistaken Economy in buying the Lowest Class of Spectacles made, p. 100.	
HOW TO BLIND YOURSELF .....	100
Reading in a Railway Carriage, p. 100.	
POPULAR KNOWLEDGE ABOUT THE EYES .....	101
Generally Wrong, p. 101.—Instances, p. 101.	
LADIES' VEILS .....	102
Are Veils beneficial or not to the Eyes, p. 102.—Reasons <i>pro</i> and <i>con</i> , p. 102.—On the whole the Use of Proper Veils advantageous, p. 102.—Spotted Veils injurious, p. 102.	
INFLAMMATION OF THE EYES .....	103
FATIGUE OF THE EYES .....	103
THE CARE OF THE EYES WHEN RIDING, DRIVING, OR CYCLING ..	104
COMPLAINTS OF THE EYE .....	106
Squinting, p. 106.—Cataraet, p. 106.—Glaueoma, p. 107.—Hay Fever, p. 107.	
ON THE RAPID INCREASE OF SHORT-SIGHT AND OTHER FORMS OF DEFECTIVE VISION .....	107
HOW TO DIMINISH SHORT-SIGHT .....	108
Out-door Occupations for Short-Sighted Children, p. 109.—Short- Sighted Persons increase their Calamity, p. 109.	
INDEX .....	113

## LIST OF ILLUSTRATIONS.

	PAGE
DIAGRAM OF THE EYE (Fig. 1) .. . . . .	17
OPTICAL MODEL OF THE EYE (Fig. 2) .. . . . .	18
DIRECT VISION SPECTROSCOPE (Fig. 3) .. . . . .	21
THE BEST FORM OF READING-LAMP (Fig. 4) .. . . . .	26
CORRECT POSITION TO READ BY LAMPLIGHT (Fig. 5) .. . . . .	27
WRONG POSITION TO READ BY LAMPLIGHT (Fig. 6) .. . . . .	28
READING BY FIRELIGHT (Fig. 7) .. . . . .	29
COLOURED GLASS EYE-PROTECTORS (Figs. 8, 9) .. . . . .	34
SPECTACLES TOO WIDE FOR THE EYES (Fig. 10) .. . . . .	38
SPECTACLE BRIDGES (Figs. 11-14) .. . . . .	38, 39
SPECTACLES TOO NARROW FOR THE EYES (Fig. 15) .. . . . .	39
SPECTACLES OF CORRECT WIDTH (Fig. 16) .. . . . .	39
SPECTACLES OF THE SAME PATTERN, VARIOUS SIZES (Figs. 17-22) .. . . . .	40
PANTASCOPIC SPECTACLES (Fig. 23) .. . . . .	42
ARTISTS' SPECTACLES FOR LONG-SIGHT (Fig. 24) .. . . . .	42
PULPIT SPECTACLES FOR SHORT-SIGHT (Fig. 25) .. . . . .	42
SPECTACLES WITH DOUBLE SIDES (Fig. 26) .. . . . .	42
SPECTACLES WITH HOOK SIDES (Fig. 27) .. . . . .	42
SPECTACLES WITH X BRIDGE (Fig. 28) .. . . . .	42
SPECTACLES WITH K BRIDGE (Fig. 29) .. . . . .	42
WEARING A SINGLE EYE-GLASS (Fig. 30) .. . . . .	43
IMPROPER USE OF SPECTACLES (Fig. 31) .. . . . .	44
THE OPTOMETER (Fig. 32) .. . . . .	49
THE WIDTH-MEASURER (Fig. 33) .. . . . .	49
SHORT-SIGHT TEST-LENSSES (Fig. 34) .. . . . .	50
AXIS-CUT PEBBLE LENS SEEN WITH POLARISCOPE (Fig. 35) .. . . . .	51
ORDINARY PEBBLE LENS SEEN WITH POLARISCOPE (Fig. 36) .. . . . .	51
IMPERFECT CRYSTALS OF PEBBLE AS SEEN WITH A POLARISCOPE (Figs. 37-39) .. . . . .	51, 52

	PAG
SIGHT-PROOF SPECTACLES (Fig. 40) .....	.. 52
DIAGRAM SHOWING CAUSE OF OLD-SIGHT (Fig. 41) .....	.. 53
DIAGRAM SHOWING OLD-SIGHT CORRECTED (Fig. 42) .....	.. 54
PERISCOPIC LENS, ACTION ON LIGHT (Fig. 43) .....	.. 57
DOUBLE-CONVEX LENS, ACTION ON LIGHT (Fig. 44) .....	.. 57
HOW TO WEAR OLD-SIGHTED SPECTACLES FOR READING (Fig. 45) .....	.. 61
DIAGRAM SHOWING CAUSE OF SHORT-SIGHT (Fig. 46) .....	.. 62
DIAGRAM SHOWING SHORT-SIGHT CORRECTED (Fig. 47) .....	.. 63
HOW TO WEAR SHORT-SIGHTED SPECTACLES FOR WALKING (Fig. 48) .....	.. 66
SMALL BINOCULAR FOR SHORT-SIGHT (Fig. 49) .....	.. 68
LENSES FOR CORRECTING ASTIGMATISM (Figs. 50, 51) .....	.. 76
STRIPED LETTERS FOR DETECTING ASTIGMATISM (Fig. 52) .....	.. 77
CIRCLES AND LINES FOR DETECTING ASTIGMATISM (Fig. 53) .....	.. 77
DIAGRAMS FOR DETECTING ASTIGMATISM (Figs. 54-56) .....	.. 78-80
A NEW FORM OF FOLDERS (Figs. 57-59) .....	.. 84, 85
SPRING-FOLDERS OF VARIOUS SHAPES (Figs. 60-67) .....	.. 85, 86
FRANKLIN'S SPECTACLES (Fig. 68) .....	.. 94
SPRING-FOLDERS WORN AT AN ANGLE (Fig. 69) .....	.. 97
PART OF A BROKEN SPECTACLE-EYE (Fig. 70) .....	.. 100

# OUR EYES.

## THE ART OF SEEING.

"The eye cannot see when the mind is blind."  
*Arab Proverb.*

It might at first thought appear that it cannot be necessary for any person to learn to see. A moment's consideration will show that this is a mistake. Before an artist can draw any object well, he must be able to see the most delicate lights and shades upon its surface. Years ago I was often surprised at the remark that "a photograph is much more beautiful than the landscape it was taken from." Now I know the speaker *could not see* the landscape.

It is stated that a lady observed to the great artist Turner, pointing to one of his pictures, "Dear me! Mr. Turner, I never saw anything like that!" "No, madam," answered Turner; "don't you wish you could?"

Those who are in the habit of using microscopes or telescopes can see an object or minute details which would not be visible to a person who looked through one of those instruments for the first time. The remark is frequently heard that a particular person is an excellent judge of some article. It will generally be found that the person can *see* differences in various samples of the article which are not visible to most people.

A good photograph of a statue appears almost solid. This is due entirely to the delicate *shades* being faithfully represented in the photograph. There are but few persons

whose sight would be keen enough to enable them to detect the whole of these shades on the original statue. This is the principal reason that a drawing, however beautiful or truthful, never looks as solid as a photograph.

I need do no more than briefly allude to the enormous extent to which the optician's art has increased the scope of our vision, enabling us by the aid of powerful telescopes to view objects at so great a distance that they would otherwise be invisible ; and, on the other hand, to see easily with powerful microscopes objects close to us which would also be invisible on account of their excessive minuteness, as well as by the aid of the spectroscope to determine the materials of which the sun and stars are composed. Yet the advantages gained from these contrivances are not so great to humanity as those derived from the use of spectacles as aids to failing vision.

During the last few years great improvements have been made in spectacles by skilful oculists and opticians, but of these improvements little or nothing is generally known.

My object is principally to give a popular account of these improvements and their application ; but I must begin by giving a brief description of the human eye.

Fig. 1 is a diagram of the eye, which shows the Cornea, the Iris, the Ciliary Muscle, the Crystalline Lens, the Aqueous Humour, the Retina, and the Choroid Coat.

The outer white coating of the eye is called the sclerotic coat, or sclerotica. The central portion of the eye is known as the cornea ; behind this is the iris, the coloured portion of the eye. There is an opening in the centre of the iris, known as the pupil ; this is simply an aperture through which light can pass. This aperture opens when the eye is in a faint light, and closes when it is exposed to a strong light. The space between the cornea and the iris is filled with a watery fluid. Just behind the iris is the crystalline lens. This is popularly supposed to be the pupil of the eye, and you have doubtless heard the expression, " having

the pupil taken out of the eye." Now, you could no more take the pupil out of an eye than you could take the key-hole out of a door, as it is simply an opening which admits light into the crystalline lens.

Outside the iris is the ciliary muscle, a ring of muscular fibre. This muscle makes the crystalline lens more convex whenever we look at an object within a few feet of us.

The whole space of the eyeball is filled with the vitreous humour, a jelly-like substance.

The back part of the inside of the eyeball is covered with

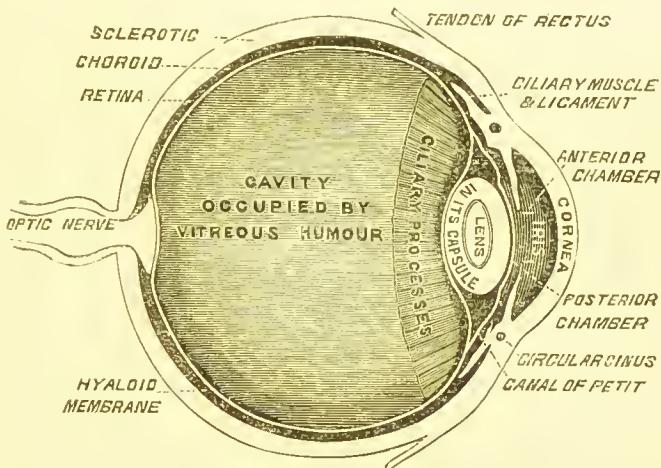


Fig. I.

a most exquisitely sensitive nerve tissue, known as the retina. On this retina a picture of any object in front of the eye is formed. The optic nerve extends from the brain to the back of the eye, and small branches of it extend all over the retina. These convey to the brain the information as to the kind of picture which is formed on the retina. Outside the sensitive surface or retina there is a coating of black pigment, known as the choroid coat, which serves as a background to stop rays of light which might otherwise pass through the retina.

There are several large muscles round the outside of the eyeball. By means of these the eye may be moved to either side, or upwards or downwards, so as to get a clear view of any object.

Fig. 2 is not an anatomical, but a rough mechanical and optical model of the eye. It is made of an opal lamp globe, with large openings at the top and bottom. On one side is a common bull's-eye ; this represents the crystalline lens. The other opening is covered with a piece of partially transparent tracing-paper. This receives the image formed by the bull's-eye, or crystalline lens. It will be seen that the letter A appears reversed ; in simple language, it is upside down. So are the images of the objects we see on our retina ; they are all upside down.

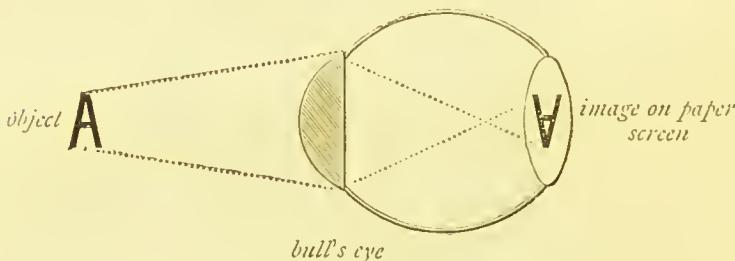


Fig. 2.

One of my scientific friends, the brother of one of our most distinguished musical composers, has taught himself to read print when held upside down. Occasionally he will read a book in this manner when he is travelling in an omnibus or a railway carriage. It is not long before some passenger draws his attention to the fact that he is holding the book the wrong way. Their astonishment is great when he quietly informs them that he prefers reading with the book held in that direction. I am afraid that occasionally they have doubts of my friend's sanity. If I have explained the action of the eye with sufficient clearness, you will at once understand that the letters of the

book held upside down really appear upon my friend's retina in an erect position.

Sometimes the question is put to me, "Will you believe your own eyes?" To this I reply, "As an optician, certainly not."

Numerous ways in which the eyes can be deceived are no doubt familiar to you. The best known of all is, perhaps, that known as Pepper's Ghost. In this optical illusion a number of persons appear to be upon a stage or platform in front of the audience; in reality they are before the stage, but out of view of the audience.

How easily our eyes may be deceived may be proved by a very simple experiment which you may make. Take a large card—the size is of no consequence. Make a large black circular spot on the card, on the right-hand side, one inch in diameter; then, at a distance of three inches from it, on the left-hand side, make a black dot the size of a pin's head. If you hold this card at exactly one foot from your right eye, and look intently at the small dot, the large black circle will not be visible. This arises from the fact that a portion of the retina is not sensitive to light. The insensitive portion is of sufficient extent to prevent a man's face from being seen at six or seven feet distance.

When looking for very minute stars, or other faint objects difficult to see, practical astronomers look for them sideways, out of the corners of their eyes. The centre of the retina is not so sensitive as the outer portions, which are much less used.

There is good reason for believing that the eye takes a photograph of every object looked at intently.

Rabbits have been held before a window for a few seconds and then killed. A picture of the window has been found on their retina.

The impression on the retina is generally said to last about the sixteenth part of a second, but this depends upon the brilliancy of the object and the length of time we look at it.

**A FEW WORDS ABOUT LIGHT.**

Now I must say a few words about light.

Light is the cause of all colour. Colour is only a sensation in the brain, caused by a particular kind of light being reflected from an object into the eyes. We say trees are green, but they would not be green unless they were lighted by a light which contained green rays. This can be proved by a simple, yet perfectly convincing, experiment.

Place several pieces of paper of various bright colours on a large piece of white paper, taking care to avoid the use of yellow. Now illuminate these with a spirit-lamp which has had salt sprinkled on the wick ; the whole of the brightly coloured papers will appear a colourless grey ; the reason being that the spirit-lamp giving out only a pure yellow light it is not capable of rendering the other colours visible.

**COLOUR-BLINDNESS.**

About one person in every twenty-five is to some extent colour-blind—that is, cannot distinguish accurately between colours. In extreme cases such persons cannot distinguish between red and green. This defect often exists without being suspected. The worst case I have ever known was that of a workman who had been for years in my employ. One day, I gave him a number of photographed stereoscopic slides to sort into two lots—one coloured, and the other plain. Soon after he had sorted them I examined them. They were divided into two lots, composed almost equally of coloured and plain slides mixed together. This induced me to test his eyes for colour-blindness, and I found, to my surprise, that he could not tell the difference between a piece of black cloth and a piece of scarlet.

This defect may be of the greatest importance.

Both on railways and on ships, lamps with coloured glasses are used for signalling at night, and flags in the

day time. Any sailor, guard, or engine-driver suffering from colour-blindness might be the cause of a fatal accident by mistaking the colour of the signal shown.

All such persons should have their sight tested.

I have contrived a spectroscope (Fig. 3) in which there is a complete ribbon or rainbow of colour, with an arrangement by means of which I can shut out all but a small portion of this coloured rainbow, and allow only a small strip of any particular colour to appear. The person whose sight is being tested is then asked to name the colour that is visible.

An easy way of testing the sense of colour is to give a person two or three skeins of Berlin wool of different colours. Then give him a bundle of wool of mixed colours, and ask him to match the colours of them.



Fig. 3.

This test is not to be compared to that with the spectroscope for accuracy.

But under certain circumstances, even persons whose colour-sense is most acute and accurate may be deceived as to colour.

#### COMPLEMENTARY COLOURS.

When a coloured object is looked at for some time, if the eye be directed to another object which is grey or colourless, this object will appear to be strongly coloured, with just the opposite colour to that of the first object the eye had been regarding.

By the expression the opposite colour, I mean the complementary colour—that is, the colour which added to the first colour would produce white.

Blue causes the grey portion of the object to appear yellow, while yellow causes the grey portion to look blue. Red causes the grey to appear green, while green makes the grey look red.

It must not, however, be supposed that if green paint be mixed with red, or orange paint with blue, that white will be the result.

Owing to the impurity in an optical sense of all our colours, we obtain only dark greys by such mixtures. But, if you reflect the complementary colours from the *spectrum*, in which the colour is optically pure, one on the other, you can make colours that will be very different from those you will obtain by the mixture of pigments ; and by using carefully selected pieces of coloured glass in two lanterns, colours will be produced differing widely from those obtained by the mixture of pigments.

The colours of stained glass are much purer and brighter than those of any of our pigments.

There are three ways by which colours can be mixed : 1st, by grinding up the colours together ; 2nd, by laying coats of colour over each other ; 3rd, by making narrow lines or dots of the colours close to each other. The two last methods are but little known or used, yet they are the methods which give the most beautiful as well as the most scientific results.

On a *revolving* wheel place a disc covered with black and yellow paint mixed together. The disc appears green. On another disc let a portion of the surface be coloured yellow and a portion black. On rotating this disc the colour will be not dark green, but dark yellow. Mix blue and red, and then blue and yellow, first by mixing the paints, and then by colouring a portion of each disc, and note the different result obtained by the two methods.

The diagrams invented by Mr. Gorham, the inventor of the colour-top, will show the appearances I have just described. In those diagrams the grey portion of a blue disc

appears yellow, the grey portion of a red disc appears green, and the grey portion of a green disc appears a reddish chocolate.

It is from want of knowledge of this fact that many artists over-colour their pictures. They make their shadows too blue in what they would call a warm picture—that is, a picture of a red or orange or yellow tone of colour; and the shadows in a cold or bluish picture they make too red. This in another direction proves the necessity of learning to see. Such artists require to be shown that perfectly colourless shadows in a bluish picture will look red, and equally colourless shadows in a reddish picture will appear blue.

Although we cannot with our unassisted eyes tell how pure or impure colours or paints are, we can detect their impurities by means of a spectroscope.

There are many coloured liquids and glasses which look to us almost exactly alike. Now let us see how they look when we analyze or cross-question them by sending the colour through a spectroscope. Take, for instance, blood, cochineal, permanganate of potash, and chlorophyl. By using a miniature spectroscope, blood may be distinguished from other liquids similar in colour, and an idea may be formed whether the blood is fresh. This has been of use in examining the clothes of a suspected murderer, and has led to detection. A quantity of dried blood that would lie on a pin's head could be analyzed by this process.

One instance in which this method was applied seemed to me of great interest.

Some years since, a murder was committed in Cannon Street, in the City. The housekeeper in charge of some offices was killed in the passage of the house, about eight o'clock in the evening. Shortly afterwards, a man, a distant relative of the murdered woman, was arrested on suspicion. On inspecting his clothes a number of small, dark red stains were found upon them. These were scraped off the cloth

by an eminent chemist. This chemist brought half the amount of the dried substance to me. Half of this minute quantity I sent to a distinguished scientific friend, and half I experimented on with the spectroscope.

The amount being so small we could not make a sufficient number of experiments with it to enable us to say positively what substance it was, but both my friend and myself came to the conclusion that it was certainly *not blood*. Had blood been present there would have been visible to an educated eye some very faint lines, known as blood-bands, in the spectrum.

When the trial came on, the man proved an *alibi*, and explained that the dark spots on his clothes were red shellac varnish, which he had got on him at a hat-maker's who used it for stiffening the shapes of his hats.

#### HOW TO PRESERVE OUR EYESIGHT.

Now for some important hints for preserving your eyesight. Never look at an intensely bright light for any length of time, or a permanent image may be formed on the retina. Avoid, most carefully, exposing the eyes to a very bright light after they have been in darkness, as such changes are injurious, and have been known to produce blindness.

Many persons are in the habit of sitting without a light long after daylight and even twilight has faded, saying they enjoy sitting in the dark, and then having a powerful lamp brought into the room, or a number of gas-burners lighted.

This luxury, if it be one, should not be indulged in. The effect of the sudden bright light is intensely painful—a kindly warning of Nature which we should do well to take heed of.

When using a microscope, always incline it as much as possible towards the horizontal direction. Most persons use the microscope almost upright. Looking down into the

microscope in this position gorges the eye with blood by stopping the circulation in the neck.

Since the publication of my first edition of this book, Mr. G. Davies, the author of an excellent work on "Practical Microscopy," has called on me, and thanked me for condemning the use of microscopes for students which are made so that they can only be used in a vertical position.

He tells me that he has known many cases where injury to the sight has been caused by using them.

A Newtonian reflecting telescope is very superior to an achromatic telescope for those who have any fear of straining their eyes, as the stars and other heavenly bodies can be seen best with this kind of telescope when they are directly overhead.

If a person wishes to look at them when they are thus situated, he must lie down on his back if he uses an achromatic telescope. With a reflecting telescope the celestial objects may be viewed when they are overhead by the observer looking horizontally into the telescope.

When adjusting a very bright lamp-flame, if you wish to do it slowly, look at the flame through a slit formed by almost closing two of the fingers. This will protect the eyes greatly.

#### HOW TO READ BY LAMPLIGHT.

The best lamp for reading or working is a paraffin or oil lamp, moving up and down on a rod, with an opal glass shade, *open underneath*, white on the inside, and dark-green on the outside. The lamp should be used so low down that the light is reflected strongly on to the object, and so that the flame cannot be seen by the reader. Such a lamp is shown in Fig. 4. If you do not use such a lamp as I have described, then always turn your back to the source of light when you are reading, as in Fig. 5, so that the light may fall on to the book, instead of coming into your eyes.

While I was correcting for the press the proof of the above remarks on reading by lamplight, the following excellent paragraph on the subject, by Mr. Mattieu Williams, appeared in the *Gentleman's Magazine*. As the writer is both a scientific and a literary man, his opinion, founded on experience, appears to me of exceptional value.

"I am now wearing spectacles, and otherwise suffering, as are thousands of others, simply because up to about

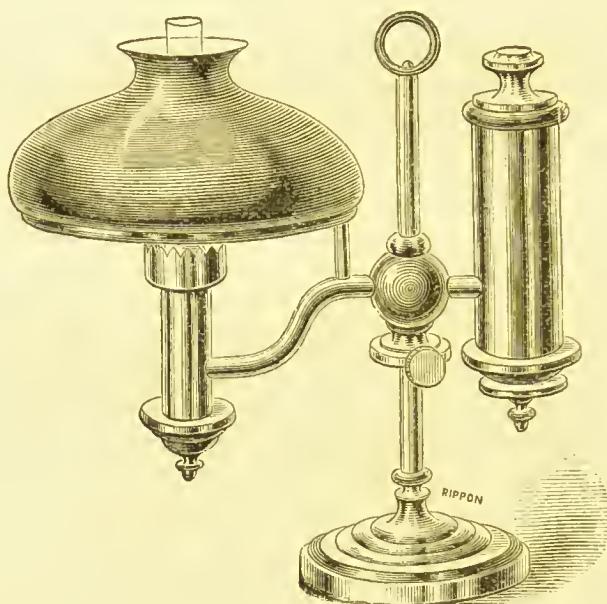


Fig. 4.

forty-five years of age I usually worked at reading and writing with my face to the light, which is the worst possible position. With my back to the light, I can now read or write for two or three consecutive hours without visual inconvenience; with a front light, half an hour produces pain and inflammation. The reason is simple enough. The light should fall on the book or the paper, and the eye should be in shadow—the shadow of the head. If anybody

doubts this, let him try the experiment of reading small print first with his back to a window that rises well above the height of his head, and then with his face to the same window. Then, in order to explain the difference he will experience, let him, in an otherwise dark room, stand before a looking-glass, hold a candle behind his head, and observe in the glass the size of the black opening to the retina of his eyes. Now bring the candle round, and the contraction



Fig. 5.—Correct position for reading.

of the iris will at once be strikingly shown ; the central black window of the eye will be reduced to half its former size. Then let him try the one-sided light—the left-hand light—that is so dogmatically recommended. He will find that the left iris is far less expanded than the right ; the right pupil is largest, *i.e.* the eyes are forced to act irregularly, or with an unequal strain upon that exquisitely constructed system of muscular fibres consti-

tuting the *sphincter pupillæ*. As the protection of the retina depends upon the ready response of these to the light, their healthy action and preservation for old age are of the greatest importance. There is a collateral advantage of the back light in the case of children. If the windows are fairly high, the shadow of the head only falls on the book when the pupils lean forward, and to escape from this they avoid the pernicious habit of thus leaning and pressing



Fig. 6.—Incorrect position for reading.

the breast-bone against the edge of the desk. The best light of all is that which comes from above in such a manner that the eyes are protected from glare by the shadow of the superciliary ridge, or overhang of the forehead and eyebrows, while there are no shadows whatever on the desks or the books. But this is only attainable where there are no rooms above. Billiard-players perfectly understand the advantages of such top-lighting, and arrange accordingly."

Always lean well back when reading, and hold the book up, as shown in the engraving (Fig. 5). Do not lean forward and face the light, as in Fig. 6.

Never read by firelight, in the position shown in Fig. 7. Myopia, or short-sight, is often produced, particularly in young people, by reading in an imperfect light.

Never read when lying down in bed; or if, owing to

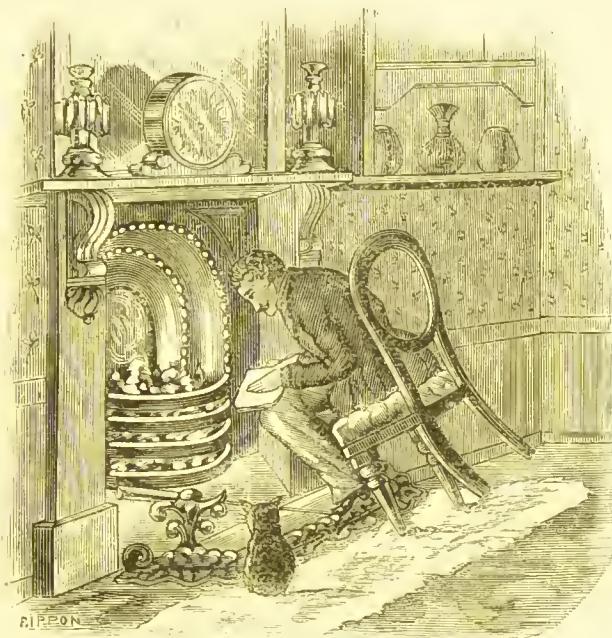


Fig. 7.—Reading by firelight.

illness, you feel you must do so, then do not hold the book up over your face, but place it on the pillow, and read with your face downward and the back of your head to the light.

If you have weak eyes, never sleep with the bed in such a position that your eyes face a window. Turn the side of the bed, instead of the foot, towards the window, and lie on your side with your face turned away from the light.

Never read books printed in small type if you can get large-type editions. There is no doubt that reading in railway trains when in motion is very injurious to the eyesight, on account of the vibration causing the letters to move about before the eyes. I fear it is of no use for me to say, Do not read while you are travelling ; but if you *will* read, let it be books or newspapers printed clearly in large type, and if you read at night-time in the train, carry a reading-lamp, and suspend it behind you, above your shoulder on your right-hand side, and lean back in the carriage, so as to bring your book near to the light. The lamps in railway carriages do not give sufficient light to read by without injuring the sight.

Reading in a railway carriage in motion is much easier and less injurious if a large card or an envelope be held just under each line you are reading, moving it down as each line is read.

Ladies should never do any needlework with dark materials by artificial light.

When looking at pictures in a gallery, do not stand under them and raise the eyes only. Stand at some distance from them and raise the whole head, or, rather, throw it back slightly. This will, to a great extent, prevent the fatigue and headache generally experienced after looking at pictures hung above the level of the eyes.

#### GENERAL CARE OF THE EYES.

The use of tinted writing-papers is very beneficial to the eyes, but the colours chosen should be grey, neutral tint, or bluish-green ; reddish-brown, pink, yellow, or strongly yellowish-green should be avoided.

Those who suffer in any way from impaired vision, and have much writing to do, should use the new type-writers, which print one letter for each key that is touched. The letters engraved on the keys are about a quarter of an inch

in height, and there is no strain on the eyes beyond looking at these. The writer may lean back in a chair and change from one position to another without ceasing to work, and there is none of the cramping effect upon one set of muscles, so often experienced in writing.

Looking for any length of time through wire-gauze window-blinds is injurious to the sight. An inspector of the detective police came to me respecting his eyes ; he had nearly blinded himself by looking through such blinds for several weeks together. The use of these ugly dusty screens is, however, happily being discontinued in favour of light cane blinds, which have many advantages. Ladies' veils, when thick, frequently injure their sight.

I would urge the desirability of keeping the eyes cool. It is a good plan to sluice the eyes closed every morning with cold water. Constantly practising this tends to strengthen and preserve the sight ; but if the eyes are actually inflamed, water of the same temperature as the air in very cold weather may increase the inflammation, and tepid water will, under such circumstances, be most beneficial.

Slight inflammation in the eyes may be relieved by bathing them with cold or nearly cold tea, or a little Goulard water, which may be obtained of any chemist.

#### THE CARE OF INFANTS' AND CHILDREN'S EYES.

To the precautions we should take with regard to our own eyes, I must add a few words of warning respecting those of our children.

Never allow infants to be exposed to the full glare of the sun. Men shade their eyes with the brims of their hats, and ladies carry parasols. But infants wear nothing which projects over the forehead ; they are constantly to be seen in perambulators with their unprotected faces turned full towards the sun, and I have frequently seen them left by careless people in such a position, with their poor little

eyes closed, moving uneasily about, and unable to find any relief from their suffering.

It is difficult to estimate the amount of mischief which may be done to their eyes or health by such thoughtless cruelty.

In schools, children generally suffer from deficiency of light, after having while infants, out of doors, been exposed to it far too much.

Studying in schoolrooms where there is a deficiency of light, children stoop over their books, or in any way bring them closer to their eyes in order to assist their imperfect view of the letters ; owing to this the vision becomes strained, and is often seriously impaired ; and if the practice be long continued, a permanent change takes place in the vision, so that it becomes myopic, or short-sighted. This I shall treat of more fully in a separate chapter. Under the head of "test types," I have described how to test children's eyes, to ascertain if they require spectacles.

#### THE USE OF COLOURED GLASSES.

Coloured glasses might more often be resorted to with advantage. For writing or reading, light blue are the best, and some prefer this colour for walking ; but generally it will be found that neutral tint or London smoke are the pleasantest, and they are equally beneficial for outdoor use. Whether for indoor or outdoor use, they are generally worn much too dark.

Most persons will require only plane and parallel glasses ; and here I must caution my readers that such lenses should always be made of optical glass, *coloured all through and worked and polished on both surfaces.* The greater part of the coloured glass spectacles and folders sold are made of white glass, which is coloured only on one side, and not worked at all, but simply fire-polished. Such glasses have many imperfections, as seeds, specks, blebs, or veins, besides

unequally polished places, scratches, and other surface-markings.

Owing to the dark colour of the glass, these escape notice when looking at them ; but they cannot fail to be prejudicial to the eyesight of those who wear them, who have to look *through* them. Whatever spectacles are worn, whether for short or long sight, for walking or reading, coloured glass or clear, they should be worn well away from the eyes, for two reasons—the eyes should have free play of air over them and be kept cool, and the lenses and frames should be kept well off the eye-lashes. If in the involuntary winking of the eye, which is always going on, and should never be restrained, the lashes touch any part of the spectacles, the eyes will soon become irritated and often inflamed if they are naturally weak.

Visitors to our seaside watering-places should wear coloured glass spectacles or folders to moderate the intense glare of the reflected sunlight from the sea and sand, from the roads and pavements, and from the white houses, as it frequently causes headaches, which are wrongly ascribed to biliousness, and eventually impairs the vision.

Figs. 8 and 9 show the best forms of coloured glass eye-protectors made. The last-named have gauze sides to more effectually exclude dust, wind, or insects.

Dr. Alfred Haviland has made the practical suggestion that a small quantity of soot might with advantage be mixed with the cement which is so freely used to cover the houses, whenever the fronts have a southern aspect.

I find blue glasses the most beneficial, violet comes next, and smoke or neutral tint last ; but either grey, smoke, or neutral tint are almost as useful, and one of these neutral shades I always recommend, because they are pleasanter than blue to wear, as they do not appreciably alter the colour of any object seen through them, *and they are much less conspicuous than blue glasses.* Many persons who read in rooms into which the sun falls, would do well to

have spectacles made with light neutral tint glass lenses instead of the ordinary white glass, as this would save their eyesight. But as a general rule, when reading by artificial light, most persons require all the light they can have to enable them to see, and for such persons lenses of coloured glass of any kind would be unsuitable.

Those who will attend to the suggestions here given for the preservation of their sight may postpone the time at which they require to take to spectacles for several years, and may by the use of proper lenses, when they are at last

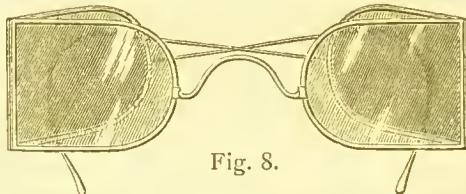


Fig. 8.

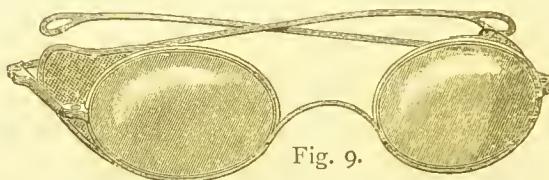


Fig. 9.

required, retain their keenness of vision unimpaired to a very advanced age.

#### **WHEN SPECTACLES ARE REQUIRED.**

The proper use of spectacles is a subject on which the public have less general knowledge than any with which I am acquainted. As a natural result, there is probably more quackery practised in this direction than in any other.

It is, above all, when we have passed middle life, and are compelled to apply to the optician for artificial aid to vision, that we require to know "how to use our eyes."

We are all interested in spectacles, for those of us who do not require them ourselves will at some time need them, and have relatives or friends who do ; and we may save them from having their pockets picked and their eyesight injured.

A common proceeding on the part of spectacle quacks is to inform those who consult them, that a complaint is coming on in their eyes, and only the peculiar spectacles which they alone can supply will arrest it and prevent them from losing their eyesight.

An honest optician would, if any disease of the eye were either present or imminent, recommend that a competent surgeon-oculist should be consulted without delay—but of course the opinion of such a competent practitioner is just what a quack desires to avoid.

Since the first edition of this book was printed two new methods of quacking spectacles have been largely adopted.

The first is for chemists to send out a number of pamphlets puffing the merits of some particular spectacles for which they have been made agents, and professing to be able to test the eyes and suit any vision with them. These pamphlets are generally printed by the wholesale dealers from whom they obtain the spectacles, and only the name on the cover or title-page is altered to suit the case of the particular chemist who has to distribute them.

A worse method of quackery even than this is selling spectacles and folders, which, of course, have magical properties according to their vendors, at exhibitions, fancy fairs, and bazaars. The dealers in these spectacles actually take hold of people by the shoulder and put the spectacles or folders on to their faces before asking leave to do so. If these are to be the opticians of the future, then the necessary qualities for a successful optician will be a face of brass, lungs of leather, the tongue of a Cheap Jack, and the conscience of a German Jew.

There is no particular age at which spectacles are certain

to be required. Men can seldom see well without them after they are 45, or women after 40. Very often, indeed, women require them at 30, and do themselves irremediable injury by not using them. In many cases they fear looking old, but more often they think that the longer they can put off using them the better. In this way they frequently postpone using spectacles for two or even three years. When they are compelled to take to them *they have impaired their vision*, and require stronger glasses than they would have done, and often then they cannot recover the full clearness of vision they formerly possessed, and which they might have preserved to extreme old age had they but known "how to use their eyes." Once you cannot see clearly by lamplight or gaslight without holding the object farther from you than usual, you require spectacles, and by working or reading without them you may bring on distressing headaches, or do your eyes an injury which no optician can afterwards remedy.

The proper reading distance is from 12 to 14 inches from the eye.

A correspondent of mine has aptly named the stage at which spectacles are first required as becoming "Bradshaw blind."

As soon as it is found that the figure 3 cannot be readily distinguished from 5 in the popular railway guide by artificial light, spectacles should at once be obtained.

A worse mistake than postponing getting a pair of spectacles suited to your own sight, is to use your father's or mother's spectacles, if you have such by you. By doing this, you may in a few months age your eyes as much as with the use of proper spectacles they would have aged in as many years. These remarks apply quite as much to gentlemen as to ladies. *Spectacles when required are a luxury, not a nuisance.*

Another mistake, commonly made by short-sighted persons, is wearing the same spectacles for reading and

walking. This can scarcely ever be done without straining the eyes.

Nearly all short-sighted persons require two pairs of spectacles, and these often differ widely in focus. Occasionally those suited for reading require to be only half the focus of those suitable for walking. At times the power of accommodation is so deficient that three pairs of spectacles are required to see objects at different distances, say, from reading-distance to the horizon.

Different spectacles should, as a rule, always be worn for playing music from those used for reading, because the music is placed on the instrument at a greater distance from the player than the book is held while reading.

Although, of course, the power of adapting the vision or seeing clearly is, as a rule, first lost for close objects, yet occasionally it is first lost for distant objects. I have known persons who fancied that their eyesight was seriously and permanently impaired from being unaware of this fact. A pair of short-sighted spectacles gave them clear vision directly.

Some long-sighted or old-sighted persons whose sight is acute at one particular distance are very deficient in focussing power. In some cases focussing power is almost entirely absent, and I have known them to require spectacles of four degrees of power, for reading, writing, playing billiards, and walking. Happily such cases are rare, but there are few long-sighted persons whose eyesight would not be improved by using at least two pairs of spectacles which differ in power, the strongest for reading and a rather lower power for writing or playing music. Many persons find a great advantage in using a rather stronger pair of spectacles for reading at night-time than they use during the day.

Spectacles used for reading only should not be worn high up on the nose, close to the eyes, as is generally the case, as in this position they prevent the free play of air to the eyes, and frequently touch the eyelashes and so irritate the

eyes. When worn as low down on the nose as can conveniently be done, they assist the vision more, and allow the wearer to look over the top edges at all distant objects, as well as avoiding the above-named evils.

No attention is generally paid to a pair of spectacles fitting the face, yet, to obtain the full benefit from them, they

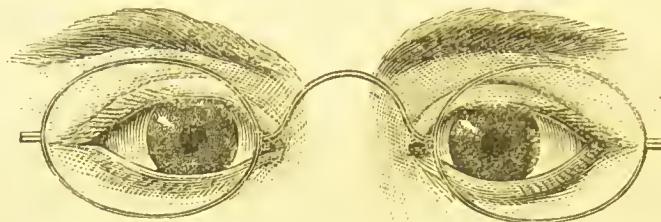


Fig. 10.—Spectacles too wide.

ought to fit the wearer's face so well that the centres of the glasses come exactly opposite to the pupils of the eyes. It is curious that people who would never think of wearing a dress or coat unless it fitted them, will wear any pair of spectacles, though the result is more disfiguring and is injurious to the sight. It is necessary for an optician to



Fig. 11.



Fig. 12.

keep at least a dozen different patterns of spectacles to select from, and even then spectacles must often be made to fit the face, and this should really add very little to their cost. Spectacles to suit different personal peculiarities require to vary in many ways.

They must have high, medium, low, and nearly straight bridges (Figs. 11 to 14); long, medium, and short sides,

and must differ greatly in the width of the eyes. If the spectacles are either too wide or too narrow, as shown in the diagrams, they have a tendency to produce double-



vision, that is, to make every object appear to be doubled. In Fig. 10 the spectacles are too wide; in Fig. 15 they are too narrow, and in Fig. 16 they are the correct width.

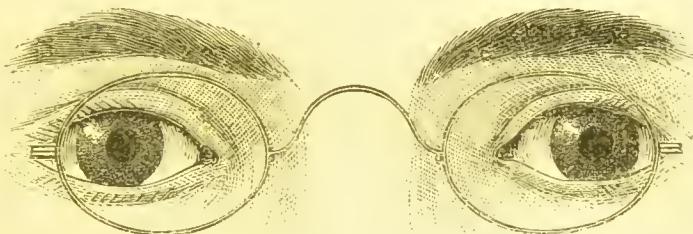


Fig. 15.—Spectacles too narrow.



Fig. 16.—Spectacles right width.

Figs. 17 to 22, which are drawn exactly half the size of the real spectacles, show six of the widths most required.

While as a general rule all spectacles should fit so that the centres of the lenses should correspond with the centres of the eyes, yet *in exceptional cases* slight deviations may be made with great benefit by an optician

who understands the eyes sufficiently well to use this plan with advantage. The method is known to those skilful in its use as decentering the lenses. This must not for a moment be mistaken for the mischievous missfits which are

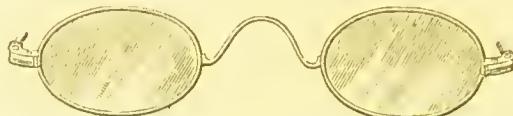


Fig. 17.

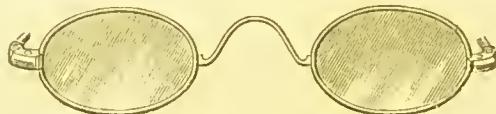


Fig. 18.

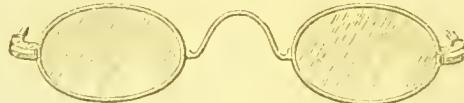


Fig. 19.

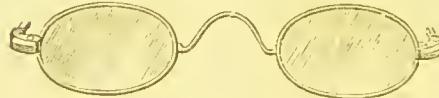


Fig. 20.

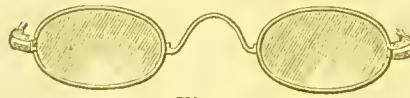


Fig. 21.

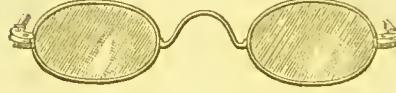


Fig. 22.

Spectacles differing in width from  $2\frac{1}{8}$  to  $2\frac{5}{8}$ .

of constant occurrence. Two cautions may be given which should receive careful attention: short-sighted persons should not wear spectacles which are narrower than their eyes, and old-sighted persons should not wear spectacles which are wider.

The bridge of spectacles should fit the nose well, and never be much wider than the nose, as is frequently the case, for, if so, the spectacles are sure to shift on one side, putting both lenses much out of the centre. When the eyes have become accustomed to such a false arrangement, although they are strained and suffering from it, they yet cannot wear at once without great inconvenience, and sometimes even positive pain, a pair of spectacles accurately centred. See a case in point at foot of page 72.

One cause of wearing spectacles belonging to other people doing so much mischief is that the spectacles so worn are generally of a totally different width to what they ought to wear.

A young lady who was very short-sighted came to me with inflamed eyes, and complaining of great pain in them and constant headache. I learned that a friend had made her a present of a pair of gold spectacles, and she had got lenses fitted to the frames very similar in power to those she had been using, and she admitted that since that time her eyes had been getting rapidly worse.

I soon saw the reason--the spectacle frames were a full eighth of an inch too wide for her, though in all other respects they suited her fairly well. I put a new and smaller bridge to the spectacles. This made them narrower by the requisite amount, and improved their appearance. In a few weeks all the trouble in the eyes disappeared.

Old spectacles are frequently bought in a small country town, and worn in spite of many symptoms that they are wrong. From first to last they cause the wearer considerable distress, and a certain amount of permanent impairment of vision.

Pantoscopic frames (Fig. 23) and Artists' frames (Fig. 24) are both made to enable the wearer to look over the upper edges of the lenses at any distant object for long-sight; and Pulpit frames (Fig. 25), are used to look through the lenses at distant objects only. There are also frames with double sides

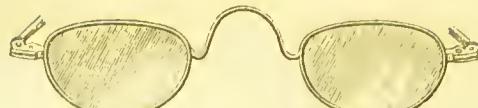


Fig. 23.—Pantascopic Spectacles.



Fig. 24.—Artists' Spectacles.

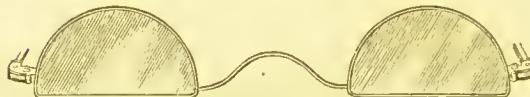


Fig. 25.—Pulpit Spectacles.

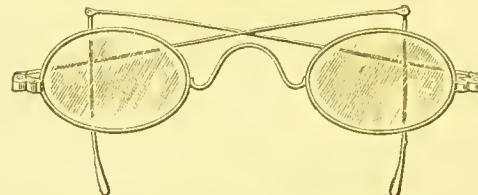


Fig. 26.—Double-side Spectacles.

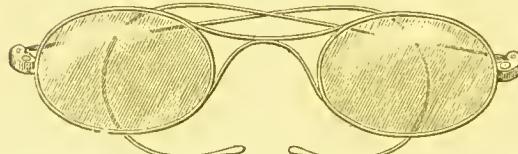


Fig. 27.—Hook-side Spectacles.

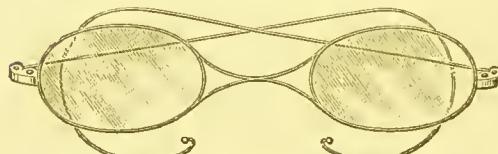


Fig. 28.—X Bridge Spectacles.

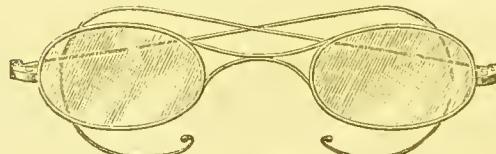


Fig. 29.—K Bridge Spectacles.

(Fig. 26) and hook sides (Fig. 27); and yet again, frames with X bridges (Fig. 28) and frames with K bridges (Fig. 29).

Two things I must earnestly warn you never to do. Never use a single eye-glass (Fig. 30). Never keep a pair of spectacles on your face *that are suited for reading* when you are walking about, or, in fact, one moment after you have done looking at some near object through them, unless you place them so low down on the nose that you can see over the top edges. For walking they should always be taken off.

While I was reading this for the press I received a letter



Fig. 30.

from a lady who had fallen downstairs in her reading spectacles and broken them. Most likely the spectacles were the *cause* of the accident.

Very recently I saw a gentleman in the Charing Cross Railway Station wearing a pair of reading spectacles. With these on he was trying to make out the time by the station clock. This clock must be about thirty or forty feet high, and he was straining his eyes to see it through a pair of

spectacles which would not show any object clearly at a greater distance than fifteen inches. By wearing them he was seriously injuring his eyes, and risking an accident in getting in and out of the railway carriage. Fig. 31 illustrates the effect of a person looking at a church clock under similar conditions.

I have traced many accidents to persons who were



Fig. 31.

long-sighted keeping on their spectacles occasionally when going downstairs.

The generally received idea is that the spectacles worn should always be the lowest power the wearer can manage to see with, because the eye should have a slight adjustment left to make for itself. This is entirely wrong. The spectacles worn should fully meet the want of adjustment or focussing power.

*There should be not only no conscious strain, but no unconscious strain on the part of the wearer.*

The only good method of telling whether spectacles are required, and if so what power will be suitable, is by means of the optometer, which measures the focussing power of the eye. Having ascertained this, a lens of the strength indicated should be placed in a second optometer, and the distance at which the eye will focus with this lens should be carefully determined ; *but an optometer in unskilful hands is capable of giving most erroneous results.*

Sometimes, though not very often, persons imagine that because they have reached a certain age they *must* require spectacles. I recollect one instance of this kind. A well-known admiral came to me and told me that he had never worn spectacles, but he was quite sure he required them.

I gave him a book of test-types, and asked him to tell me the smallest-sized type he could read, and at what distance from the eye he could read it. Having obtained this information, I gave him a pair of very low-power spectacles, suitable for a long-sighted person, and then, directly afterwards, a pair suited for a short-sighted person. He said he could see equally well with either. This was just what I expected.

"Now," said I, "here is a pair of spectacles that will suit you."

He put them on, and, taking up the book, he said, "Oh yes, I can see better with these than with either of the others."

"I thought you would," was my reply, "because if you take them off you will find that they are a pair of spectacle frames—there are no glasses in them!" Had this gentleman gone to a quack, he would certainly have given him spectacles several years before he required them.

I only wish to say one sentence more on this subject :

Do not believe that any loudly puffed spectacles can be of special service to you. There is skill, of course, required

in making good lenses of fine optical glass or Brazilian pebbles ; but there is still more skill required in suiting the spectacles to each particular person's requirements.

How can this skill, only to be acquired by knowledge combined with great experience, be possessed by every watchmaker, chemist, jeweller, or ironmonger who buys a dozen pairs of spectacles and writes up that he is a **PRACTICAL OPTICIAN?**

To be able to suit correctly the majority of persons who apply to him for spectacles, an optician must keep a stock worth several hundred pounds ; and even then, to suit all peculiar cases, he should be able to grind lenses and make special frames as required.

Remember that a pair of spectacles which would exactly suit one person would, in a short time, almost blind another.

I doubt if more than one person out of each dozen receives the full benefit from spectacles that he should do, while there are probably three or four out of each dozen who permanently injure their eyesight by using spectacles unsuited to them.

A great number of persons have their eyesight injured by beginning with spectacles unsuited to their requirements. In the majority of cases opticians take it for granted that both eyes are alike, although cases of unequal vision of the two eyes are very frequent. Where lenses suitable for equal vision are given in such cases, one eye does nearly all the work, and the other next to none. Unfortunately the mischief does not end here, but, after a time, the eye which has the acutest vision becomes teased, and gives the owner trouble which compels him to resort to an oculist or surgeon. All this trouble can be saved by using lenses of unequal focus, suited to the requirements of each eye separately.

Those who live in foreign parts, or out-of-the-way places, at times wish to send word to an optician in some large

town, of the power of the spectacles they are wearing, to get him to send them others of a similar kind or still stronger.

There is no simple method known of obtaining the power of spectacles in the case of concave lenses, which are required for short-sight; but in the case of long-sighted spectacles, where convex or magnifying lenses are used, it may be easily done in the following manner. Take the lens in the right hand and place a card on the table facing the sun, then move the lens backwards and forwards from the card until the smallest and sharpest spot of light (which will be a small image of the sun) is formed on the card. If the distance from the edge of the lens to the spot on the card is now measured with a foot-rule or a measuring-tape, that will be the focus of the lens in English inches.

The nature of astigmatism I shall describe elsewhere; see page 76.

Astigmatism is seldom corrected, or even sought for, by the general run of opticians; even some of our leading oculists at times fail to distinguish its character and accurately to correct it, but it is really a matter of the utmost importance to do so. A book larger than this might be written on astigmatism without exhausting the subject; but I will only give two illustrations, which will be readily followed, of the injurious effect of not correcting astigmatism. The first of these applies to short-sight, the second to long-sight.

I have had many persons apply to me stating that they were short-sighted, but they could get no short-sighted spectacles to suit them properly. Whenever they tried such spectacles they always dazzled them, and strained their eyes so that they had to give up using them. In all such cases I have found that there was very little short-sight indeed, often none worth naming, but there was myopic astigmatism, which should have been corrected with cylindrical lenses. In endeavouring to correct this, the uninformed

optician, or spectacle-seller, had given them lenses many times too strong for them, and so strained the sight.

Upon correcting the astigmatism with cylindrical lenses alone, all the trouble disappeared. I have particularly in my mind one case of a young lady between seventeen and eighteen years of age, who came to me wearing spectacles with deep concave lenses (4 dioptrics); these would have been suitable for a person extremely short-sighted. Under these her eyes were breaking down. On giving her a pair of weak *cylindrical* lenses (only  $1\frac{1}{2}$  dioptrics) she saw much better with them than she ever did with the deep concave lenses, and her eyes began to get strong and well from that time.

Again, in the case of astigmatism in long-sighted persons. The want of definition caused by astigmatism can be *partially* overcome by using convex lenses—that is, magnifying lenses—of increased power. Such lenses are always given, and answer their purpose for a short time; then their wearers want lenses of greater power to overcome the defect in their sight. Owing to this peculiarity they increase the power of their spectacles yearly instead of about once in two or three years, and I have had instances where they have changed their spectacles every six months, with the result that persons fifty years of age were wearing spectacles old enough to suit the majority of persons between seventy and eighty.

The resort to cylindrical lenses for correcting the astigmatism stops the mischief directly, and frequently much less power is required in the spectacles than has been used before.

Year after year I have been pained by people living in the country coming to me for spectacles, when their eyesight had been first injured by using improper lenses. After long consideration I have been able to devise small instruments, which I can send through the post, and from the indications these give I can tell with accuracy what lenses are required. I have suited many cases in this

way by correspondence, when the eyes of the correspondents differed greatly in focus. I shall have great pleasure in forwarding full particulars to any person, post free. The testimonials at the end of this work show the great satisfaction this system is giving to my numerous clients, whose number is increasing constantly.

#### BROWNING'S METHOD OF TESTING THE SIGHT.

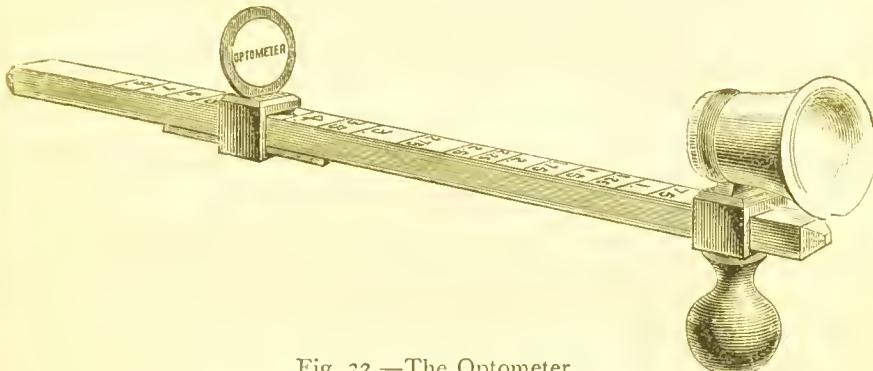


Fig. 32.—The Optometer.

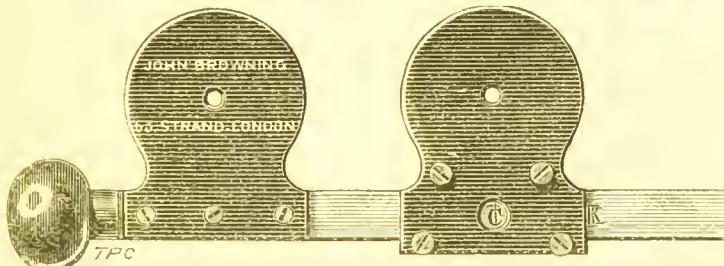


Fig. 33.—The Width-Measurer.

I here give three engravings of the principal instruments I send out, in practising my method of suiting the sight by correspondence. They are called the Optometer, the Width-Measurer, and the Short-Sight Test-Lenses (Figs. 32, 33, and 34).

I cannot, however, give the method I adopt in using these instruments, because it varies with the varying condition of the sight of the applicants.

Lenses of pebble, rock-crystal, or, as it is termed by mineralogists, quartz, keep a clear bright-polished surface very much better than glass, and most persons prefer them.

A correspondent of *Knowledge* inquired recently if these lenses were not cut at varying angles out of the quartz crystals, and whether this would not cause them to perform badly. My experience is that this matter seldom receives the attention from opticians which it should do. First-class opticians should keep pebble lenses cut truly at right angles to the axis of the crystal, though they are necessarily more expensive.

Such lenses, when tested by polarized light, should give concentric coloured rings, as in Fig. 35. Lenses not cut at right angles to the axis of the crystal give coloured bands, as in Fig. 36.

Every piece of crystal used for making spectacle lenses should be carefully tested by means of a polariscope. Many crystals possess peculiarities which would cause a lens made from them to give most imperfect images.

Mr. W. G. Lettsom has kindly lent me some specimens of crystal, of which I give engravings as seen through a polariscope (Figs. 37, 38, and 39).

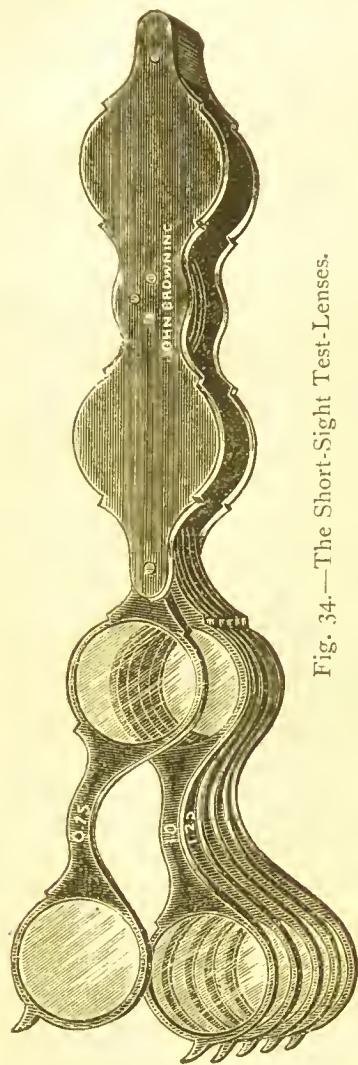


Fig. 34.—The Short-Sight Test-Lenses.

Such specimens would be quite unfit for the production of lenses of any kind.

A great many persons have one eye more sensitive to colour than the other, and this leads me to say that many

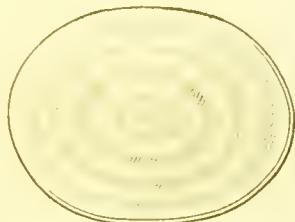


Fig. 35.

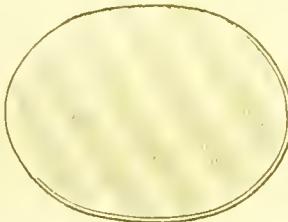


Fig. 36.

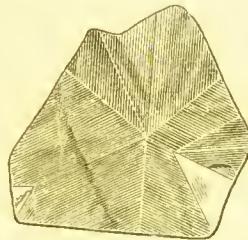


Fig. 37.

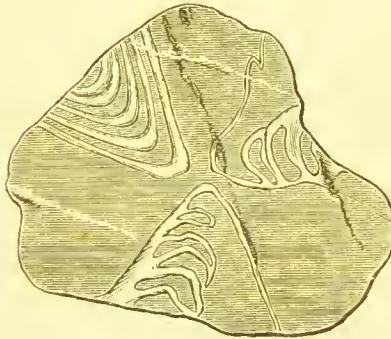


Fig. 38.

more persons than would be supposed have two odd eyes. In some, the eyes differ in acuteness of vision or sensitivity to colour; in others, in focus; and again in others, in their sensitiveness to light. In most cases, when spectacles

are required, the difference between the eyes may be corrected by using lenses of different power. To this subject I shall further on devote a short chapter, as it is a matter of considerable importance, though it is commonly

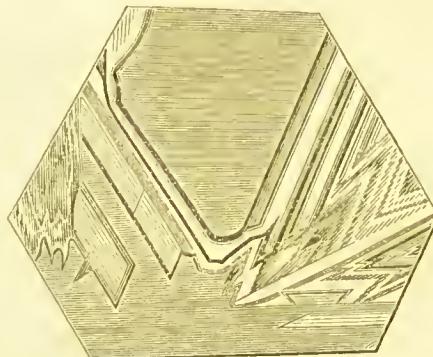


Fig. 39.

passed over by opticians without any attention ; indeed, I fear, where they possess the skill, they will not take the trouble to determine the amount of the inequality, or to make spectacles which will correct it.

#### SHOT-PROOF SPECTACLES.

In view of the numerous accidents which have occurred in shooting, shot-proof spectacles have just been introduced.

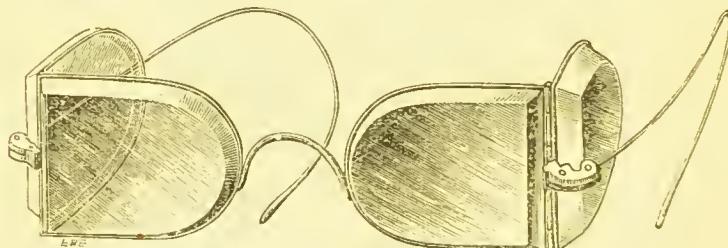


Fig. 40.

They are made of four very stout planes of Brazilian pebble, bevelled to an edge, and fitted into strong nickelized frames

(Fig. 40). They are so formed as to protect the eyes at the sides as well as in front from injury. Though they are strongly made they have no unpleasantly weighty feeling when they are on the face.

#### OLD-SIGHT.

*Old-sight, or, as it is technically called, "presbyopia,"* is a condition of the eyes in which the power is wanting to focus them on near objects, and thus see things clearly which are within about twelve or fourteen inches from the face. This condition is generally the result of advancing years, and spectacles with convex lenses to counteract long-sightedness are usually required by men at about the age of 47, and by women at about 45; that is to say, few persons can dispense with spectacles after these ages, without straining their vision and permanently injuring their sight.

But to this rough general rule there are many exceptions. After a severe illness, which greatly enfeebles the system, spectacles for long sight are often required. I have frequently prescribed spectacles for such cases, and after a few weeks diminished the strength of the lenses, and in a few months my client has been able to dispense with them entirely.

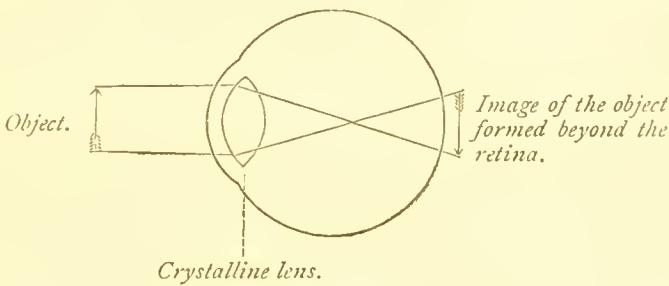


Fig. 41.

The diagram (Fig. 41), shows the condition of the eye in old-sight when the image of the object is not formed on the

retina, but would be formed at a distance behind the retina.

Fig. 42 shows the same eye with a convex lens interposed, by the aid of which the image is formed nearer to the crystalline lens, and therefore within the globe of the eye, so that it falls on the retina.

The condition of the eyes varies constantly with the state of the health, and even with the digestion. When hungry the vision is often imperfect, and most persons cannot see so well just after a full meal.

Ladies before they reach middle age frequently require spectacles to enable them to see to read easily, for a month

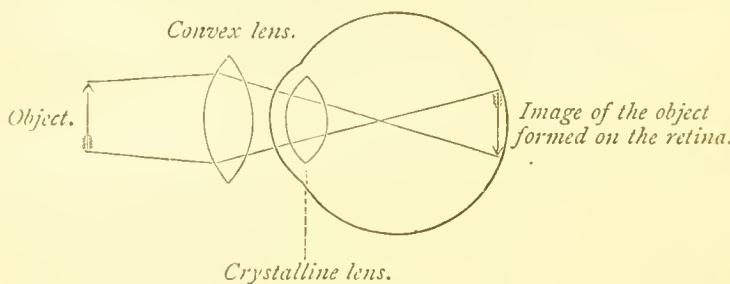


Fig. 42.

or two after child-birth. Occasionally young children are naturally deficient in the power of accommodation, and require spectacles to correct long-sightedness, even when they are only 7 or 8 years old; and I have had several cases of old-sighted spectacles being necessary at between 3 and 5 years of age. Often I have had great difficulty in convincing clients, who come to me for advice about their eyes, that all they require is a pair of old-sighted spectacles when they are not nearly middle-aged, or in many instances not even of age.

Sometimes the condition of vision called long-sightedness is brought on between the ages of 16 and 30, through unfairly trying the eyes by reading small print, or making

minute drawings, or doing needlework for a length of time and for many hours continuously by artificial light.

In youth, those who are blessed with average good sight read easily and naturally with the book held at about twelve inches at the farthest from the eye, but as they advance in years the distance at which they can see clearly increases, and they insensibly hold the book further and further away from them.

When at length the failure to focus at any convenient distance, or pain in their eyes, compels them to wear spectacles, use has become second nature to them, and they wish to read with the book held at about eighteen inches from their eyes, as they have been doing ; this cannot be done without injury to their sight.

The reading distance with spectacles suited to correct old-sight should not be more than fourteen inches.

#### THE BEST DISTANCE FOR READING.

The best distance for reading is generally between twelve and fourteen inches for middle-aged people ; with old people it is frequently less than twelve inches, but the distance varies slightly with almost every case. Those who have been short-sighted from youth, and have worn concave glasses for reading, can seldom be made to read safely as far as twelve inches, when they become longer-sighted for near objects.

No absolute rules can be laid down with regard to suiting the sight with spectacles. An optician must have his knowledge of optics always to fall back upon, but he will meet with many failures if he attempts to treat all eyes alike by hard and fast rules. *The eyes are not mere optical instruments, but are most delicate and sensitive physiological contrivances possessing as many peculiarities as their owners.* A physician cannot treat his patients' bodies all alike, nor should an optician treat his clients' eyes so.

My correspondents frequently ask me to give them the

number of the lenses with which I have supplied them. They do this with the idea that they could then get similar spectacles elsewhere. In this they are mistaken. Different opticians use various numbers to indicate lenses of the same degree of strength, and small dealers, not liking to confess that their stock is not sufficiently extensive to enable them to supply lenses of the exact strength required, will supply the nearest power they have. When these lenses are too strong in cases of short-sight, or too weak in cases of long-sight, much mischief is often done which cannot be undone.

The numbers so generally used by opticians are most unsystematic and misleading. I have recently had a pair of lenses for short-sight marked No. 1, which were twenty-four inches minus solar focus, and on the same day another pair marked No. 1, which upon being tested proved to be forty inches minus solar focus. This shows that persons ordering their spectacles by numbers cannot depend on obtaining lenses of any particular well-defined power. The only true system of indicating the power required is that known as the dioptric system. Unfortunately, the number of lenses required to be kept in stock, the value of the sets of lenses which must be kept for testing, and the study which is necessary to understand them compared with the old rule of thumb method, will, I fear, prevent most opticians from adopting it.

Occasionally for correcting old-sight I am asked for periscopic, meniscus, or concavo-convex lenses, by clients who suppose that such lenses are superior to the double-convex or double-concave forms in general use. The reason such lenses are believed to possess some advantage is, I presume, because they appear to coincide with the outward form of the eye. But the purpose of a spectacle lens should be to produce a distinct image of any object in front of it with as little action on the rays of light which it causes to diverge or converge as possible.

This is best effected by the double-convex or double-concave lenses, because they divide the deviation of the rays equally between the two surfaces. This is clearly shown by the two illustrations (Figs. 43, 44). A (Fig. 43), is a periscopic lens, and in this it will be seen that the convergence of the rays which pass through it takes place entirely at the first surface; while in B (Fig. 44), which

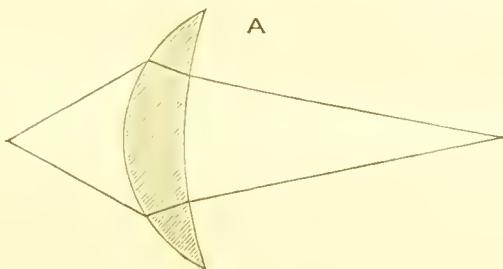


Fig. 43.

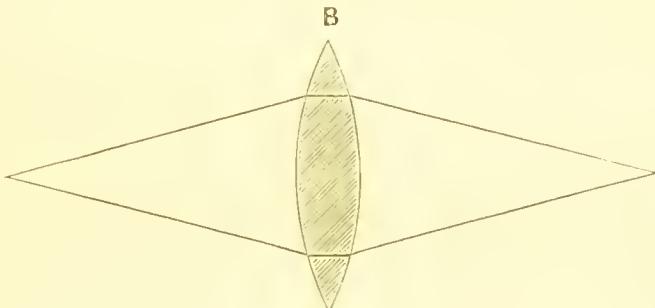


Fig. 44.

represents a section of a double-convex lens, the outer curve of the lens is much less, and the rays suffer convergence equally at both surfaces—that is, as they enter and as they leave the lens.

It is generally supposed that the necessity for spectacles is caused by the eye flattening. In reality the cause or causes are complex, but principally they are twofold. The crystalline lens, which forms the image on the retina, with

age becomes harder, and the ciliary muscles, which alter the focus of the eye by changing the form of this lens, become weaker, so that they are incapable of rendering the lens sufficiently convex to focus on an object nearer than fourteen or fifteen inches from the eyes.

More distinct definition may be obtained, of course, under such circumstances, by holding the book or other object further from the eyes, but this strains the sight by diminishing the apparent size of the object, and reducing its luminosity. As at double the distance an object is only one quarter as luminous, this is a matter of great importance.

A highly valued scientific correspondent has written me a most suggestive letter. As the questions he asks me may occur to many of my readers, I will transcribe them almost entire ; but, for the sake of simplicity and clearness, I will reply to each query before noting down the next.

Question I.—What is the reason why spectacles of shorter focus are required for presbyopic vision (old-sight) by artificial light than by daylight ; can the difference of intensity of light account for this sufficiently ? Some persons use a very powerful light indeed in the evening. Will the difference in the nature of the light have anything to do with it ?

Reply.—It is purely a question of the amount of light. Persons who have used spectacles for years can read without them in sunlight. The stronger spectacles enable the wearer to bring the object to be seen nearer to the eye, and as light increases in the square of the distance, the gain is very great.

Question II.—Suppose a person to possess spectacles with which he reads ordinary print at twelve inches distance, should he or should he not use stronger glasses to read smaller print ?

Reply.—Decidedly yes ; but he should not use spectacles so strong as to require him to bring the object he wishes to see closer than from eight to nine inches from his eyes, for

if he does he will experience a great strain in endeavouring to converge both his eyes on the object. If the work is so fine as to require more optical power, he should wear spectacles with a strong lens, say from two to six inches focus, in *one* eye only, and a disk of thin black metal in the other. So long as he uses ample power to see the object easily, and does not work at it too long at a time or with an insufficient light, he will not injure his eyesight.

Question III.—Some opticians prefer to cut pebbles parallel to the axis of the crystal, the lenses thus cut showing prismatic bars under the polariscope. Should they be cut in this manner?

Reply.—Certainly not ; they should be cut at right angles to the axis of the crystals of quartz. Several years ago, the late Mr. Gassiot gave me a commission carte-blanche to make him the most powerful and perfect spectroscope I could, both the prisms and the lenses in the telescopes to be entirely of quartz (pebble). I found the lenses would not perform correctly unless they were carefully cut *exactly at right angles to the axis of the crystals*. As mostly used for spectacle-eyes, they are cut at any and every angle, and they show dissimilar appearances under the polariscope. This must be wrong. Whenever a person is so fortunate as to possess a pair of eyes, it is certain that he should have a pair of exactly similar lenses in his spectacles.

Owing to the double refracting properties of the pebble, rays which enter the top and bottom of a lens cut parallel to the axis will be brought to a focus at a different distance from that of the rays which enter it on the right and left hand.

Mr. Brudenell Carter, in his book on "Good and Bad Sight," says—

"The ordinary advantages of pebble lenses may be more than neutralized if they have not been cut from the original block in the right direction. The material has the curious

property of being refrangent in one particular direction—that is, the ray of light passing through it in this direction is split up into two, and two images of the object from which it proceeds are produced. In order to make a perfect pebble lens, its axis must be at right angles to the axis of double refraction ; for otherwise, although the thickness will not be sufficient for two images to be produced, the single image may, nevertheless, be more or less blurred or bordered. The only security against this for the ordinary purchaser is to buy of an optician of repute, who will be more desirous to supply lenses of the best quality than to make the largest possible number out of a given piece of pebble."

Old-sighted spectacles for reading are scarcely ever worn correctly. They are generally worn too high up on the bridge of the nose. The result is that the wearer constantly looks through them at objects at various distances, and thus strains the vision and increases the old-sightedness.

Those who do this will age their sight rapidly, and require the glasses in their spectacles changed very frequently, and after a time they will be obliged to wear old-sighted spectacles even when walking. In my experience, ladies are much greater offenders in this respect than gentlemen.

The engraving (Fig. 45) shows how the spectacles should be worn. I am often asked for spectacles of increased power which will enable the wearer to see well fine work or small print when it is placed or held at a distance of from eighteen inches to two feet from the eyes. It is not possible to supply such spectacles ; if considerable power is required, then the work must be brought nearer to the eyes.

There is a particular distance at which each pair of spectacles will give the clearest definition, and those who value their eyesight properly will use one pair of spectacles to read with, and a weaker pair to write or work with.

Spectacles which are strong enough to enable the wearer to see small print well by artificial light are too strong for the same person to write with. The distance at which the book should be held when reading should never exceed

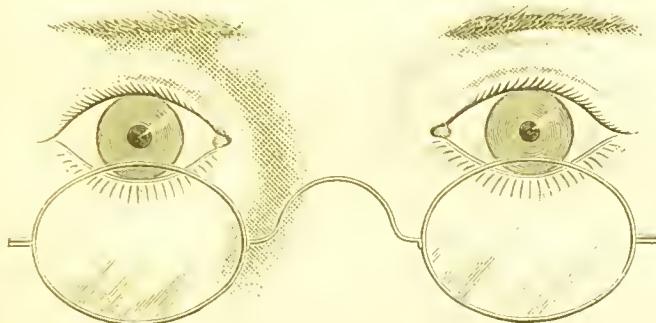


Fig. 45.

fourteen inches, while writing is usually done at about sixteen inches, and if the writer is tall and sits upright, which is of course the best position, the writing-paper is frequently upwards of eighteen inches from the eyes.

#### LONG-SIGHT OR HYPERMETROPIA.

*Long-sight, or hypermetropia*, is a form of long-sight which can be distinguished from presbyopia by the fact that the person who has it cannot see objects plainly, either close or distant, without the aid of convex lenses, the eye being too short from the front to the back for the crystalline lens to form an image inside the eye until the rays are made more convergent on the retina. This is a difficult affliction of the eye to test for, and it is generally considered that it cannot be done correctly unless the accommodation of the eye is first paralysed by atropine. Hypermetropia is exactly the reverse of true short-sight, but differs, as explained, from presbyopia, or old-sight, for which it is so frequently mistaken.

## SHORT-SIGHT.

*Short-sight, called technically "myopia,"* is the opposite condition to that known as hypermetropia, or long-sight—that is, objects at a distance cannot be seen distinctly. The eye in this condition cannot be focussed upon an object until it is brought within about twelve inches or less from the face. Minute objects at a distance of a few feet, which are easily seen by persons with full power of focussing, called normal or natural vision, to short-sighted persons are invisible. There is little doubt that short-sight is to a great extent hereditary; but it is frequently produced by reading in an imperfect light when very young. The book is held much closer to the face than it should be. This gives increased light, but the strain upon the focussing power of the eye is very great, and produces a permanent injury which can only be corrected by most carefully adapting concave lenses, which will throw the image of an object farther back into the eye, and cause it to fall correctly in focus on the retina.

The diagram (Fig. 46) shows the form of the eye in short-sight, when the image would be formed inside the eye before reaching the retina.

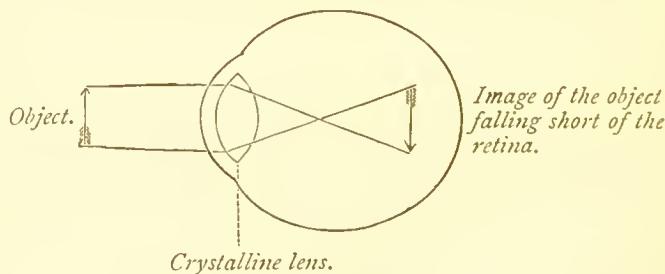


Fig. 46.

Fig. 47 shows the same eye with a concave lens placed in front of the eye, which causes the image to be formed at a greater distance from the crystalline lens, and so falls on the retina.

Short-sight should never be neglected, even though comparatively slight, and when extreme should receive the most skilful treatment. The lenses used should neither be

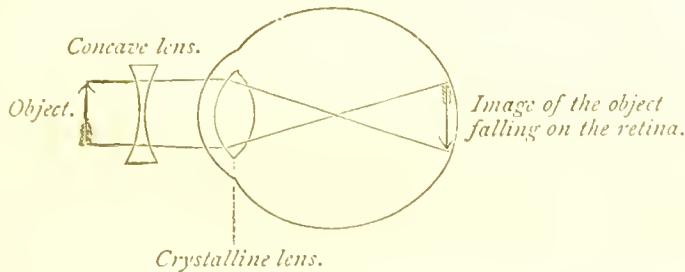


Fig. 47.

too strong nor too weak, and, as a rule, two pairs differing in focus should be used, the weakest for reading and the strongest for walking or riding.

Very short-sighted persons *should live in their spectacles*, putting them on the moment they rise, or before they leave their bedroom, and taking them off only before going to bed, wearing the weaker pair which they use for reading, so long as they are in the house, and putting on the stronger pair when walking or riding.

When clear vision of small print cannot be obtained without holding the book nearer than ten inches from the eyes, spectacles are always required, and though they may be dispensed with, it is at the risk of almost certainly doing the sight irremediable injury, or even of destroying it entirely. I have such cases before me almost daily.

It is a common mistake to suppose that myopia, or short-sighted vision, is always strong and good for close objects. In my experience, a large majority of short-sighted persons have weak sight, although undoubtedly to them objects within their range of vision appear larger than to those who can see without strain at a greater distance.

Another common mistake is to suppose that the vision

of short-sighted persons alters and improves rapidly with age. In almost every case the short-sightedness increases.

As short-sightedness is often accompanied by actual disease of the eye, it should receive the best attention.

Another mistake is to suppose that short-sighted persons can do without spectacles to read with as they grow old. This does, indeed, sometimes happen, but such cases are rare.

The power of the lenses used to correct short-sight should never be as strong as the person can possibly bear. If the concave lenses are so deep that minute objects at a distance are seen with unnatural sharpness, they are too strong, and the wearer will soon find his eyes suffering from the strain.

I frequently have correspondents who, because they require short-sighted spectacles for walking, imagine they cannot possibly require magnifying lenses to read with, and are greatly surprised when I convince them to the contrary.

As I have said, an equally common mistake is to suppose that short-sighted vision always gets longer and improves with age. It very frequently gets still shorter, and unless spectacles, accurately suited to the case, are worn, the vision becomes rapidly and seriously impaired. *It is much to be regretted that people neglect their eyes so sadly, seldom taking medical advice respecting them until they find themselves actually going blind, though they will generally consult a surgeon respecting a slight deafness, which is comparatively unimportant.*

Many persons apply to me for spectacles to whom spectacles would do positive injury, their eyes being in a condition in which they require rest and surgical attention. I have long made it a rule in all cases where I can detect disease or even functional derangement, to decline to supply spectacles until my correspondent has first sought the professional advice of a skilful *surgeon oculist*. When such persons apply to ordinary dealers in spectacles, they are

given glasses which only increase the mischief, or they are unnecessarily alarmed by being told that no glasses would be of any use to them, leaving them to infer that they are going blind.

Happily, if taken in time, there are few complaints of the eye beyond the reach of the surgeon's art, and a skilful optician may be the means of saving many eyes by giving their owners timely warning.

Failure of vision is often the first indication of some *internal* complaint which requires medical attention. With proper treatment, the clearness of vision is gained, though spectacles are mostly required, and aid materially its recovery.

It has been a great pleasure to me from time to time to hear persons say, when I have exactly suited them with lenses in very difficult cases of abnormal vision : "Why, I can see better than I have ever done in my life before." But I have derived equal satisfaction from the knowledge that in several instances, by recommending immediate recourse to a skilful physician or surgeon, I have indirectly been the means of saving my client from a dangerous illness, or possibly from loss of eyesight.

Spectacles are better than spring-folders for short-sight, particularly if the short-sight is at all extreme, because it is scarcely possible to keep the glasses in the spring-folders high enough up in front of the eyes, so that the pupils of the eyes may correspond with the centre of the glasses.

The spectacles worn when walking by short-sighted persons should have a low bridge, nearly straight, and, if anything, the upper part of the bridge should be inclined backwards instead of projecting forwards, as it does in those worn by long-sighted persons ; unless this be done it will be found that raising the spectacles up so much in front of the eyes brings them in contact with the eyelashes.

I append an engraving (Fig. 48) of a pair of such spectacles as I have described for walking, showing the manner in which they should be worn.

Several of my valued scientific correspondents have gently hinted their regret at my devoting so much of my time to the adaptation of spectacles. They would prefer that I should direct my attention to improving still further the construction of the spectroscope, the microscope, or the astronomical telescope. I believe I am more usefully employed in a practical application of science to the benefit of humanity, and I know some of my medical friends support me in this opinion.

To give an illustration of what I mean :

Some four or five years since one of my scientific correspondents brought his son to me. He was a lad about 8 or 9 years old. Although so young he was a skilful

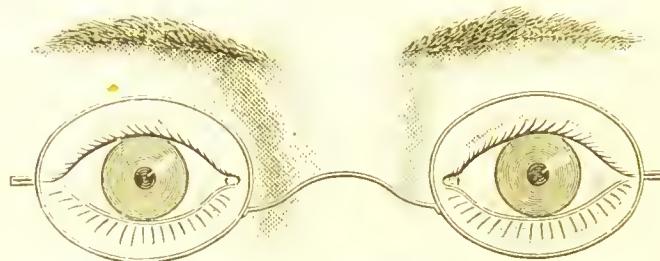


Fig. 48.

musician, playing well from music plainly printed. But his eyesight was so defective that he could not, *with any spectacles*, see clearly more than three or four inches from his face. He was, therefore, compelled to learn his pieces by heart, and his playing was limited to the one or two pieces he could remember, for he soon forgot what he had with great pains learnt. Under these circumstances I contrived and made for him a pair of small, very light binoculars or opera-glasses of aluminum, and mounted them on strong but light steel spectacle-frames. The lenses were about one inch in diameter, and the tubes of the binoculars were little more than an inch long. With these he played from printed music on a grand piano readily. I made him spectacles

with which he could read his books. Meanwhile he was put under skilful surgical treatment, and as time went on he required less and less optical assistance to his vision. Latterly he has achieved great distinction in his tasks, and plays from music by the aid of spectacles only.

The same gentleman sent his housemaid to me with a note, stating that her eyesight was so bad that she could not see to do her work ; that she had been to an optician, and also to a hospital, and she had been told nothing could be done for her case. I was able to provide her with two pairs of spectacles : with one pair she could do her work, and with the other pair she could read well.

I have often had such persons come to me in great distress, lest they should lose their means of earning a livelihood. Now, I may be wrong, but I *feel* that in suiting such cases I am doing as much good as I should be by inventing another automatic spectroscope.

Short-sighted persons should beware of changing their spectacles too often, using each time lenses of greater power. Many persons in this way irremediably injure their sight. Lenses of greater power should only be used by short-sighted persons under thoroughly competent advice. I continually have clients come to me who tell me that they require stronger glasses, and I have to inform them that they had better continue to wear those they have. Sometimes I find that it is a sight weaker which is required.

I have several clients who, under my advice, have with advantage worn spectacles of the same strength for years after they thought they must change them for a stronger sight.

In a certain number of cases the eyes become naturally longer-sighted for close objects with age, and the injudicious increase of the strength of the lenses in such cases tends to retard or even prevent this most beneficial change, at the same time straining the eyes and impairing the vision.

In cases of the most extreme short-sight, where glasses

cannot be worn of sufficient strength to give useful vision at a distance, a good small binocular, as Fig. 49, may be used with great advantage ; the strain on the sight will be less than when using glasses, because the focus of the binocular can be changed to suit the sight at various distances.

In many instances where persons have told me that they always experience a bad headache when they go to a theatre



Fig. 49.

which they impute to the excessive heat and light or both, I have recommended them to try the effect of using an opera-glass almost continuously during the performance, with the result that the headache no longer comes on. The use of an opera-glass at exhibitions of pictures will, as a rule, mitigate or prevent the headache that most people experience if they make a prolonged examination of the pictures.

#### TEST TYPES.

Many children are blamed and punished for inattention or stupidity in not learning their tasks, when they cannot see them. They are generally short-sighted, though sometimes long-sighted, and a few are astigmatic, and only require spectacles to assist their vision. To test their sight, get some printed letters exactly one-eighth of an inch high : place them at seven feet from the child whose sight has to be tested. If it cannot make the letters out clearly and easily,

and read them aloud quickly, then either a skilful optician or an oculist should be consulted. The same test will answer equally well for adults and children. A paragraph in block letters of type of the correct size for testing the sight in this simple manner is here given.

**HE WAS VERY SHORT, SPARE, AND  
WIRY: SINGULARLY PALE FOR A  
PERSON WHOSE LIFE WAS PASSED  
IN THE COUNTRY. THE FACE WAS  
IN SOME RESPECTS, BESIDES THIS,  
A MOST STRIKING FACE TO SEE.**

#### FOUR FEET TO FIVE FEET.

If desired, this method of testing the sight by means of printed letters of various sizes, which are termed test-types, may be carried further as follows: letters of this size should be easily read in a good light by persons who do not require spectacles when the reader is at a distance of from four to five feet from the book.

#### FIVE FEET TO SIX FEET.

Letters of the size of this paragraph should be read under similar circumstances when the reader is from five feet to six feet from the book.

## SIX FEET TO SEVEN FEET.

Letters of the size of this paragraph should be easily read at a distance of from six to seven feet.

## SEVEN FEET TO EIGHT FEET.

Letters of the size of this paragraph should be easily read at a distance of from seven to eight feet.

## HOW TO TEST THE SIGHT.

There are two good simple tests by which any one may find out for themselves whether they require spectacles. The best and simplest is the legibility of small print *by artificial light*. Figures the size of those given below should be read with ease and certainty.

83538535833.

These figures may, however, be read accurately and yet read with a strain that would soon injure the eyesight seriously. To be sure that this is not the case the reader should measure carefully how far he has to hold the print from his eyes to see it clearest : if the distance exceeds fourteen inches, then spectacles are absolutely required ; some persons require spectacles when the distance at which they see small print best is not more than twelve inches. Whenever a

difficulty is experienced in reading, or strain is felt afterwards, an oculist or good ophthalmic optician should be consulted, to avoid the risk of the vision being impaired. A witty schoolmaster said to me, "I have not come to you because I want a pair of spectacles, but because I want a longer pair of arms!"

An American judge, observing that one of the counsel was holding his brief at arm's-length to enable him to read it, said, "You require a pair of spectacles, brother." "Oh no," said the counsel, "not yet." "Well, you will have to use a pair of spectacles or a pair of tongs before long, brother," was the reply.

In the ordinary way of suiting the sight from a dealer's stock, spectacles are generally given too strong to short-sighted persons and too weak to those who are long-sighted or old-sighted, while those who are astigmatic generally select for themselves or are provided with spectacles so much too strong that they are often more than double the power actually required. The effect of short-sighted persons wearing glasses too strong, as, for instance, wearing glasses strong enough for walking out of doors, to read with, is to strain the eyes and increase the short-sight.

The result of astigmatic persons wearing lenses far too strong for them, is to cause them to require their glasses to be changed frequently each time for a stronger pair, and to rapidly age their sight.

When spectacles unsuitable for the vision have been worn for some time, the eyes are drawn to accommodate themselves to the spectacles. In such cases it is frequently impossible to suit the sight correctly with proper spectacles at once. A pair of lenses should be worn for some few weeks or months, *specially adapted for relieving the strain*, and afterwards it will generally be found that lenses of a lower power will give better vision.

Of the immense number of cases I have had where the use of improper spectacles had done great mischief I will

briefly describe only three, differing as widely from each other as possible.

A lady about sixty-five came to me, complaining that she could get no spectacles with which she could read. I found that she had been using spectacles for about twenty-five years, *but she had never bought a pair*; she had used her father's, her mother's, her aunt's, or any she could just manage to see with. She was a lady of large means and not illiberal; she had simply not troubled herself to think about her eyes. I am sorry to say that I could scarcely enable her to read the leaders in a newspaper in good daylight. She had ruined her eyesight.

The second case was that of a young lady about twenty-eight, who a few months previously had had a very serious illness; during her convalescence she found herself unable to read, and finding she could see better with her father's spectacles she frequently put them on and read with them. As she grew stronger, she found, to her surprise, that she could not read without them, and was recommended by a friend to consult me. I was able to get her to read with a lower power, and, if her health improves, I shall be able again to reduce the power of her glasses, but I cannot be certain that I shall be able to completely undo all the mischief she has done. Had she applied to me when she first experienced a difficulty in reading, I should have prohibited reading for a short time, and then assisted her with lenses of a low power: these in a few months she would have been able to dispense with entirely.

The last case I will name in this connection is that of one of the most distinguished living Englishmen, who came to me for some scientific instruments. I told him that the spectacles he was wearing were nearly half an inch lower on one side than the other, and that the power was much greater than he ought to wear, and added that they were straining his eyes and doing them serious injury.

He replied that he was aware of it: that he had bought

the spectacles at a small seaside town, having lost his own, and though he had tried several other pairs since, which he had been told were more suitable to his sight, he could not bear the strain he experienced in using them.

Some time after this, he came to me with his eyes much worse, asked for a pair of spectacles, and left the old ones with me. A few weeks later he kindly told me that his eyes were rapidly improving, but that for the first few days he had the greatest difficulty in using the new pair of spectacles.

My object in describing these typical cases, is to warn others not to make the same or similar mistakes, for, to my certain knowledge, such things are being done daily.

Some most curious cases come before me occasionally, arising out of mistakes in testing the vision.

Neither opticians nor oculists, as a rule, will give the necessary time and take sufficient pains to suit complicated cases of unequal vision.

One day a gentleman having inquired of me the cost of putting an axis-cut pebble lens in one eye of his spectacles, I naturally asked him why he did not want a pair. He replied, "Because I cannot see with the other eye." "Are you quite sure the sight has been properly tested?" was my next inquiry. "Well, I have had my eyes examined by —" (naming one of the leading oculists of the day), "and he says I never have seen anything with my left eye, and never shall." I asked him to let me test his sight, with the result that in less than half an hour he was reading a newspaper with the eye which was supposed to be useless, the other eye being covered over.

A much more striking case, among many I could mention, is this. A gentleman consulted me about his eyes who was wearing a ground glass over one eye. On inquiring into the particulars of his case, I found he had consulted a well-known oculist, who had prescribed spectacles, but they gave him only very imperfect vision with great pain, and the oculist then advised him to cover

one eye with either a black or ground glass, to get rid of the strain and double-image. I must own it was a very difficult case, but in about an hour I had him reading at all distances, from a book held in his hand, to words on the opposite side of the street, with both eyes, with perfect comfort.

My clients frequently express their astonishment at the time and pains I take to suit their sight. A leading London physician told me he was "delighted at the evident pleasure I took in mastering his difficult case."

A gentleman, who had very unequal vision, said to me, when I had made him special spectacles, "Well, I have worn spectacles for twenty-five years, and this is the first time I have not been given to understand that I was a stupid, troublesome man, because no ordinary spectacles would suit me."

One of the best-known London opticians, who does a large spectacle trade, said to me, "I cannot think how you can take such trouble about people's sight. I would not do it myself if they would pay me £5 per pair for their spectacles. I should not be able to sleep when I went to bed at night if I did." "And I should not be able to sleep if I did not," was my reply.

It seems evident to me that an ophthalmic optician worthy of the name should consider that every one who applies to him for a pair of spectacles is practically giving into the optician's charge his precious eyesight, and that the optician should consider himself bound to prove that he is worthy of the charge.

Testing the eyes and supplying spectacles to suit their defects is both an art and a science. All people must not be treated alike, as if their eyes were mere optical instruments. They are very complex physiological organs, and are controlled by the constitutions of their owners. Of two persons who are especially short-sighted, one can safely have much clearer vision for a distance given than the other. Of two persons who are astigmatic, one may have a full dioptric of astigmatism, and yet cannot bear it corrected,

while another, having no more than half a dioptric, will suffer from confused vision, and his eyes get worse and worse unless it is fully and carefully corrected.

The method of dilating the pupils of the eyes by the use of atropine, so much resorted to by oculists, is in nearly all cases unnecessary. A little extra time and trouble devoted to careful testing will enable equally good results to be obtained without its use, and the client will be saved much inconvenience and discomfort.

A lady told me that after the application of belladonna to her eyes she could not swallow any food the next morning, and it was some days before her throat got right. I know many worse cases than this, but it would be painful to refer to them in detail.

In concluding this chapter, I would say that an optician should never be satisfied because he has given a client fairly good vision. Whenever the glasses require changing he should endeavour to make some improvement which will give still clearer vision with less strain on the eyes.

The general method of suiting the sight adopted by opticians, is to give and recommend the pair of spectacles with which the most can be seen—in other words, with which the person who requires them can see the best; but this is anything but a safe rule of practice. The first consideration should be *the preservation of the sight*, though this is constantly overlooked.

On the other hand, I have known several oculists err in the opposite direction, by prescribing a pair of spectacles worked out theoretically on paper to correct the optical errors, but not calculated to give sufficiently distinct vision to be of much service.

One case of this kind was brought before me in a very amusing way. A gentleman called on me, and said, "I have consulted a distinguished oculist respecting my eyes, and he has prescribed for me a particular pair of spectacles, which I have had made. I have no doubt that they are

scientifically exactly what I ought to require; they have only one defect, that I cannot see anything through them. As I am an artist, this defect is of some consequence."

I had the pleasure of contriving and making a pair of spectacles for him which were without this slight defect.

### ASTIGMATISM

Is a condition of the eye in which the cornea is not symmetrically spherical, but approaches the cylindrical; that is to say, the front of the eye, instead of resembling in form a piece cut off from the side of a large marble, resembles a slice cut off from the *side* of a cork, similar to the figure in the following diagram (Fig. 50).

With an eye of this form, lines are seen much more clearly in one direction than in another. For instance, the figures on a clock-face will be of different degrees of visibility, and will vary in sharpness *as the dial is turned round*.

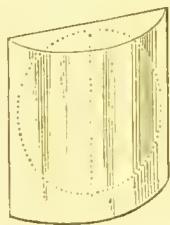


Fig. 50.

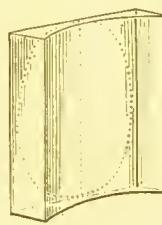


Fig. 51.

But it is quite possible with a weak astigmatism to see these tests pretty well, and yet suffer strain which will lead to impairment of vision, unless proper lenses are adopted to suit the sight.

To detect weak astigmatism of this kind I have had several letters engraved (Fig. 52); these letters, to those who are not astigmatic, should all appear equally black and plain, that is, all equally sharply defined and distinct. If some appear faint, or tinted blue, brown, or grey, while others are blacker, then the eyes are astigmatic, and the sight should be corrected by means of cylindrical lenses.

To test the eyes carefully it is necessary to close first one and then the other, and look *with one eye only* at the letters.

Frequently only one eye is astigmatic, and this at times creates the greatest trouble, because it gives unequal vision. The letters should also be looked at with the page held

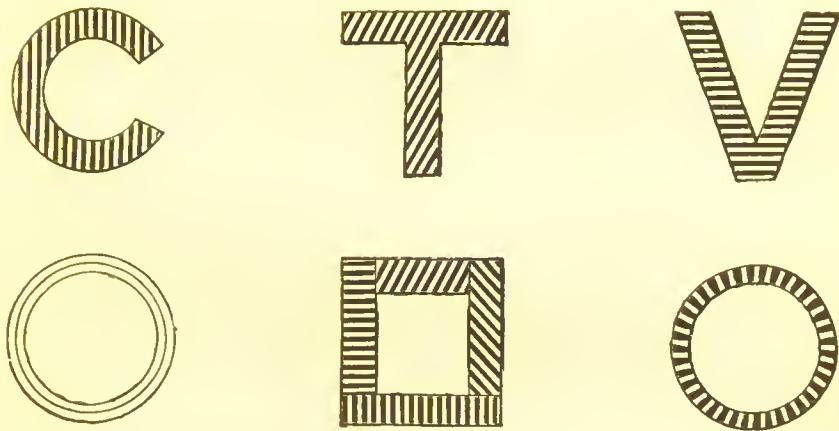


Fig. 52.

upright, and then turned on one side. If there be astigmatism the blackness of the letters (diagram, Fig. 52) will appear to change, and those which appeared lightest with

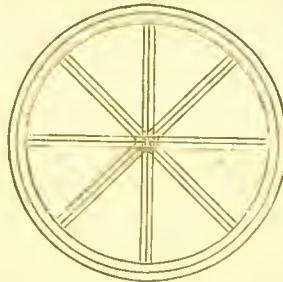


Fig. 53.

the page upright, will appear darkest when it is turned sideways, and *vice versa*.

The straight lines and circles in Fig. 53 should be seen equally clear and sharp in every part of the diagram.

Let any person who suspects that there is some defect in his or her eyesight observe the appearance of the two circular diagrams (Figs. 55 and 56), carefully looking intently at them with each eye separately, closing the other or covering it over with the hand.

If astigmatism should be present the lines will not be seen with equal distinctness in all parts of the diagram, but will in some places look blurred and indistinct, or, at least, broader and fainter in some directions than they do in others.

The most delicate test, however, that I have been able to devise is shown in Fig. 54.

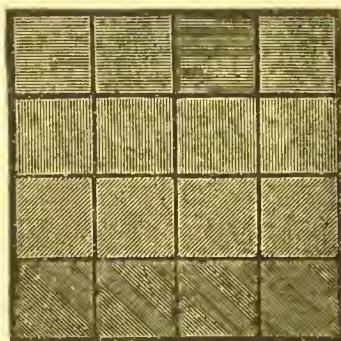


Fig. 54.

The fine white lines on this diagram in all directions should, with an eye that is not astigmatic, be seen with equal distinctness.

In many cases astigmatism exists without being suspected, and unless proper spectacles are worn to correct it, eventually the vision may become greatly impaired.

An instance of unsuspected astigmatism which has become known to me since I published the first edition of this book is both curious and interesting.

On the 22nd of February, I received a letter from the

Rev. Lionel Bartlett, of 72, Warleigh Road, Brighton, by whose kind permission I give the following extract:—

“I am very much pleased with the spectacles. Feeling sure that my sight was normal, and that I did not in consequence stand in need of spectacles, I have always set my face against the idea of using them. But the ease with which I can see with the astigmatic cylindrical lenses,

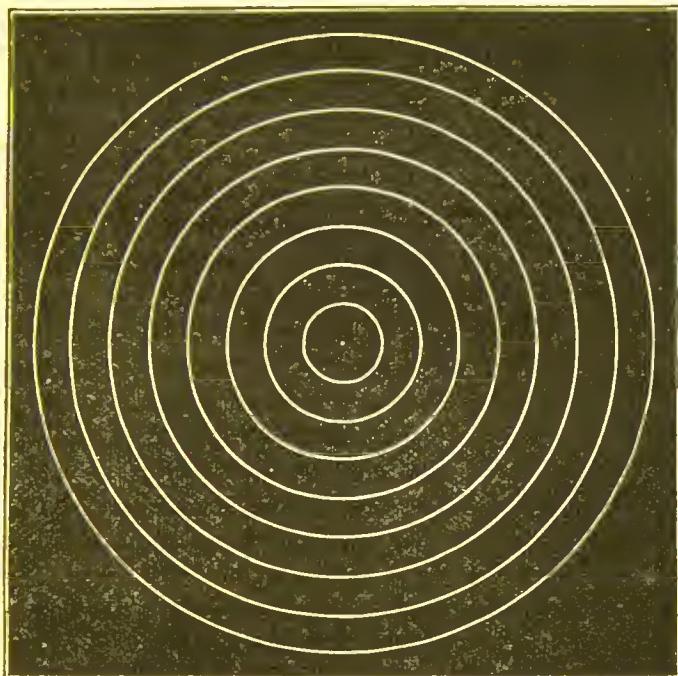


Fig. 55.

compared with the unaided sight, has disabused me of my preconceived notions on the subject.

“Before reading your book, ‘Our Eyes,’ I was not in the least aware that there was such a thing as astigmatism, and could not imagine why my eyes sometimes seemed strained after reading for a length of time continuously. I can now read for hours together, and see

much more clearly and distinctly than I could before, without any strain or aching of the eyes. Yet even first-sight spectacles make my eyes ache at once. I have much pleasure in affording this unasked testimony to the soundness of your principles."

The defect is corrected and clear vision given by adapting cylindrical lenses of the form shown in Figs. 50 and 51,

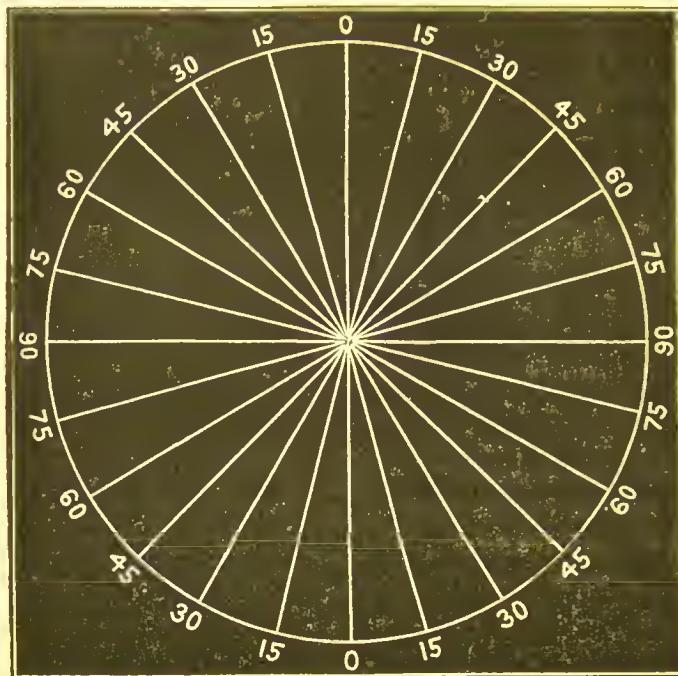


Fig. 56.

p. 76, in spectacles in such a manner that the cylindricity is in the contrary direction; that is, at right angles to the cylindricity of the crystalline lens or cornea.

Such lenses have occasionally to be put into trial frames with round eyes, in which the glasses will turn easily. The wearer should then close one eye, or cover it with the hand, and slowly and carefully turn the glass round while looking

at the figures on a clock-dial, and the glass should be left in the position in which the figures are seen with equal clearness all round the dial. The other glass should then be adjusted in the same way. The optician should carefully note the direction of the axes of the cylindrical lenses, and should cut them into an oval form and fit them up in oval frames.

I cannot recommend any person to try and get suited with spectacles for correcting astigmatism, when they know of its existence, by correspondence. The eyes frequently differ, both in the amount and direction of the astigmatism, and often differ in focus also, and the work of turning the lenses round to adjust them ought to be performed under the supervision of either a skilful optician or an oculist.

#### IRREGULAR ASTIGMATISM.

There is an irregular form of astigmatism in which the cylindricity is greater in one portion of the cornea than in the other, resembling a slice cut lengthwise off from the side of a pear.

Such cases tax the optician's art to the utmost, but I have treated several of them successfully by *inclin ing* either cylindrical or spherical lenses before the eyes.

#### SPECTACLES AND FOLDERS COMPARED.

The question is continually being put to me: "Which would you recommend me to have now, spectacles or folders?"

The answer I give depends on a variety of circumstances.

When taking to glasses for the first time I generally recommend folders, for three reasons—

1st. While people can manage to see by straining their vision, they will not be at the trouble of taking their spectacles out of the case and putting them on; and

2ndly. When they find themselves compelled to use

them, they will not be at the pains of taking them off and returning them to the case when they are not looking at near objects.

3rdly. Spring-folders can be worn by a very thin silk cord round the neck: any one used to wearing them in this manner is not likely to go out without them, and cannot possibly lay them down and leave them when away from home, as is frequently done with spectacles.

I have referred elsewhere to the habit many persons acquire of keeping on their reading spectacles to look at distant objects, though this arises almost entirely from the wish to avoid the trouble of taking them off and putting them away when they have left off reading. The use of folders has greatly increased, since the non-pressure form of folders has been perfected. I cannot recommend the folders fitted with cork nose-pieces, which have been so much advertised. After a short time the cork dries, shrinks, cracks in pieces, and comes out, leaving the claws which held the cork to stick into the wearer's nose. I have succeeded in making non-pressure folders with very light springs, fitted with tortoiseshell nose-pieces (Fig. 59, p. 84). These have all the advantages of the cork folders, without any of their drawbacks.

Where expense is not of consequence, it is the best plan always to have both spectacles and folders. The spectacles should be used for reading, writing, or drawing continuously for any length of time, and the folders whenever the vision requires assistance for a few minutes at frequent intervals. This is generally the case throughout the day, while the spectacles may be reserved for use at night-time. If used in this manner the spectacles may mostly with advantage be furnished with lenses a little stronger than those in the folders, as more assistance is required by the eyes in artificial light than in daylight.

Many persons who would like to use spring-folders say they cannot do so because they cannot get them to hold

properly on the nose. This should not be so. I usually find that they have only been shown at the utmost two or three patterns, and one of these was expected to fit any face. Of course they would not ; and having chosen a pair unsuitable for their features, disappointment was the natural result.

The bridges, springs, and rests should vary for eyes which are exceptionally wide apart or narrow ; and for noses broad or thin, or, in fact, which differ in any way from the general type of features.

Folders are not so useful as spectacles, either for long or short sighted persons, where the long or short sightedness is extreme ; because the lenses in such cases must be thick and heavy, and it is difficult to keep them with sufficient accuracy opposite to the centres of the eyes.

Those who suffer from astigmatism cannot always wear spring-folders with the full benefit which the cylindrical lenses should give them in the way of clear definition.

#### A NEW FORM OF FOLDERS.

Since the fifth edition of this book was issued, a great stir has been made about a new form of frame for spring-folders,



Fig. 57.

and representations have been issued that this form of folders, shown in the engravings (Figs. 57 and 58), is only to be had of one house. In truth, almost any optician can supply this folder. It has two peculiarities—one, a double

set of springs, which reduce the pressure on the nose, for those who can be suited with it ; but it will not suit everybody. The second peculiarity is that the inside of the plackets which rest on the nose are lined with cork instead of tortoiseshell. This is anything but an advantage ; true,

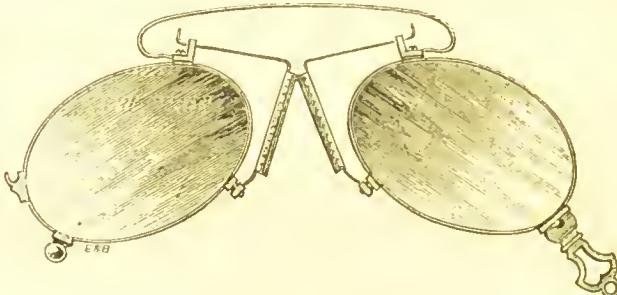


Fig. 58.

they feel soft to the face for the first time they are put on, but that is the only advantage they possess, and even that they do not retain.

As this form of folder is very ugly, and indeed disfiguring to ladies, I have noticed with great pleasure that they are

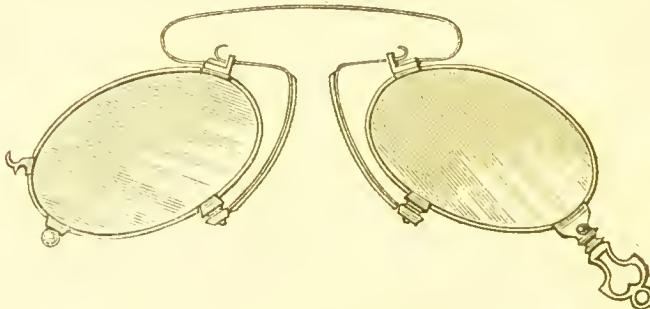


Fig. 59.

not being worn nearly so much as they were three or four years ago.

The engraving (Fig. 59) shows the most efficient non-pressure folder I have had made ; it is both more graceful and more durable than the Canadian folder.

A glance at the different patterns of spring-folders I have had drawn and engraved (Figs. 57-67) will show the variety

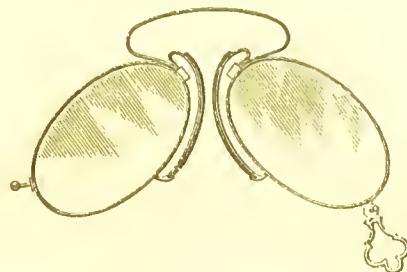


Fig. 60.

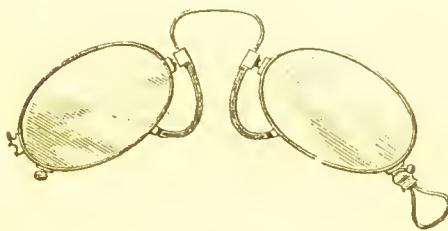


Fig. 61.

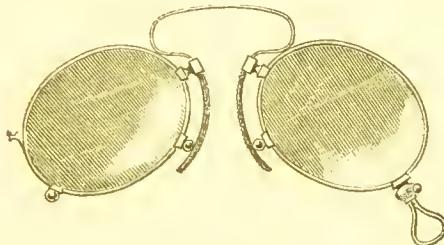


Fig. 62.

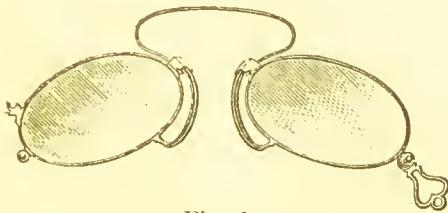


Fig. 63.

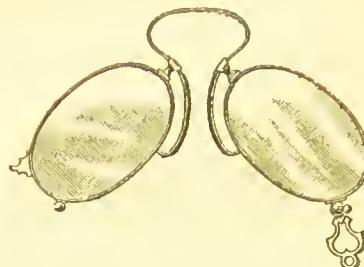


Fig. 64.

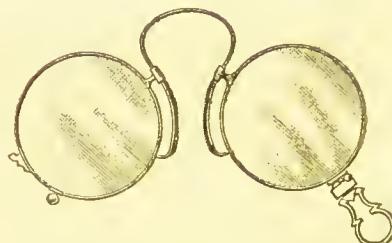


Fig. 65.

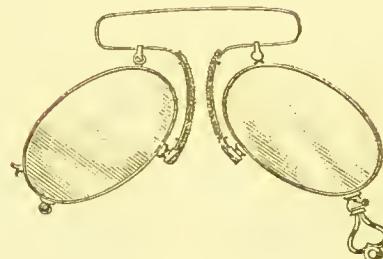


Fig. 66.

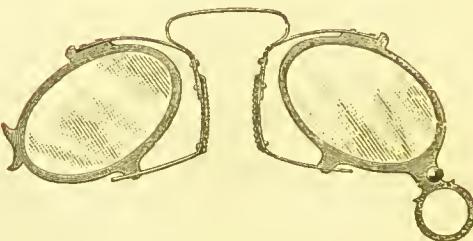


Fig. 67.

necessary to enable any one to select a pair that will set well on the face, will not pinch the nose, and yet will not be liable to fall off.

Those who have weak and extra-sensitive eyes, and suffer whenever they are in a bright light, but who experience no difficulty, under favourable conditions, in seeing clearly objects at all distances without the assistance of spectacles, would yet find great benefit from carrying two pairs of spring-folders with perfectly plane glasses. These occupy so little space that they will easily go into the waistcoat pocket. One pair should be of white glass, the other of London smoke or neutral tint. The white glasses should be used to protect the eyes from wind, dust, and insects, and the tinted glasses to modify the glare of either direct or reflected light.

I have said that those whose eyes are weak should adopt the above contrivances, but all persons would do well to resort to them who wish to preserve their sight unimpaired, and all will experience great comfort at times from employing them. *Why should our eyes, which are the most sensitive and important organs of our bodies, never be protected until they have been injured by our neglect?*

#### UNEQUAL VISION.

By unequal vision I mean a person having two eyes which differ in focus. The optometer is the only good test for this inequality, which is much more common than is generally supposed. When the difference in focus is very great, as a rule spectacles which equalize the focus cannot at once be worn ; the strain upon the eyes being unbearable. But, if a pair of spectacles be worn at first in which the lenses differ only slightly in focus, and the difference in focus is then slowly increased, the eyes may after a time become accustomed to the difference, and in this manner

both may be suited and clearer vision with comfort obtained.

This is easy to understand ; in all such cases vision with one eye has been disregarded or suppressed, and such an eye when called on to work feels like a left hand which is called on to use a pen or a knife for the first time.

About two years since a gentleman came to me who had just begun to require the aid of spectacles. On testing his eyes separately I found very great disparity of focus. I supplied him with a pair of trial spectacles in which the lenses exactly suited his eyes, so that they had both distinct vision at the same distance from a near object. The effect was pleasing to him for a few moments, yet he could not bear to look through them for more than a few minutes. As soon as I knew this, I made him a pair of spectacles in which one lens exactly suited the eye with which he had the clearest vision, and the other lens differed considerably in focus in favour of the weaker eye. These were readily worn. After about two months I increased the strength of the lens for the weaker eye, and I did it three or four times at intervals of two or three months. Now the gentleman wears a convex lens of sixteen inches focus on the left eye and a lens of forty inches focus on the right eye with great advantage and perfect comfort, and spectacles in which the lenses are of the same focus are unbearable to him. It follows that the images seen by his two eyes, though equal in clearness, differ in size. This, as I anticipated, did not interfere with his seeing plainly, as two well-defined images of different dimensions will coalesce. If any person having equal vision, by which I mean eyes of equal focus, will take an ordinary stereoscope, and place on one side of it, in the centre of the field of view, a bronze-copper halfpenny, and on the other side, in the centre of the field of view, a bronze-copper pennypiece, although the two images given through the lenses will differ very greatly in size, he will see only one image clearly defined, the dimensions of which

will appear to be midway between the size of the two coins in the instrument.

I have got many persons to make this experiment, and in every case with the same result.

From a knowledge of this fact, I ventured upon the prediction that if two discs, of colours exactly complementary to each other, could be presented one to each eye, the resulting image seen by the observer would be white.

Mr. Stevenson, a member of the Council of the Royal Microscopical Society, some time afterwards used such discs, produced by means of polarized light, and the result was as I had predicted.

At the last meeting of the British Association, held at Bath, the sight of a large number of people was tested by giving them "diamond" type to read at six, nine, and twelve inches. The results were noted as three degrees of sight-efficiency, in percentages, as follows :—

	RIGHT EYE.		LEFT EYE.		
	Men.	Women.	Men.	Women.	
Short-sighted	... ...	17·9	19·8	... 22·4	19·1
Good sight	... ...	70·2	65·9	... 63·4	66·3
Long sight	... ...	11·9	14·3	... 14·2	14·6

In this table the women have the best sight. The left eye in the women is the best, and the right eye in the men, in the following proportion :—

	Men.	Women.
Right eye equal to left	... ...	26 31
Right eye stronger than left	... ...	35 28
Right eye weaker than left	... ...	24 28

Generally speaking, the right eye is the strongest, and has the most acute vision. It will impress most persons to learn in what a small proportion of cases the right and left eye are equally strong. Yet in all such cases where the spectacles are purchased haphazard only one eye will be suited, and then trouble begins. There is only one way to guard against the sight being injured. In every case the sight should be tested carefully of each eye separately, with proper

instruments and tests, by a properly qualified oculist or optician who has had great experience, and special spectacles should be made in every case to suit the sight.

*The system of making spectacles by the gross should come to an end. Sight-troubles are increasing every day, and this system is one main cause of them.*

The general method of suiting the sight from a tray is attended with very bad results in cases of unequal vision—that is, where there is a difference in the focus of the eyes or there is astigmatism, which is commonly different in each eye.

Such a difference is of almost daily occurrence in my practice, and I once went through a long day without finding two eyes that were a pair. It seems strange that this is seldom recognized by the persons themselves until their attention is drawn to the fact. I have recorded five cases of persons who have applied to me for spectacles who were practically blind with one eye, yet they had never suspected it.

Having mentioned this to one of our most distinguished surgeon-oculists, he told me he had recently heard of such a case. A City merchant was crossing King William Street, when some dust blew into one of his eyes. To his utter dismay he then discovered for the first time that he could not see with the other, and he was with difficulty saved by a bystander from being run over.

While such cases as this are, of course, rare, many instances occur of one eye being short-sighted and the other long-sighted, so that the difference in focus between the eyes is not a matter of inches, but of feet.

When people with unequal vision have a pair of ordinary spectacles given to them with lenses of equal focus all the work is thrown on one eye. It might be supposed that the sight of this would suffer, but this is not so; it is the sight of the eye which is not used, because it is provided with a wrong lens, which suffers; but, after a time, the eye which

is constantly used begins to give great trouble from sympathy with the failing sight of the unused eye. It thus generally happens, when a client complains to me of one of his eyes being bad, that upon testing the sight carefully I am able to show him, or, indeed, he occasionally then finds himself, that the eye he complains of is really his best eye. From which it follows *that people should not trust their judgment in selecting spectacles for themselves*, nor can they be assisted by the dealers in spectacles who dub themselves opticians.

Byron has written—

“A man must serve his time to every trade  
Save criticism—critics all are ready made.”

And so, it must be added, are opticians; at least, they appear to think so.

#### UNSYMMETRICAL FEATURES.

These also are very common indeed. No two halves of a leaf are ever exactly alike. Nor are the two hands of the same person, as regards the arrangement of the veins; and as a rule no person's nose is exactly symmetrical with the other features, nor do the two sides of the face exactly resemble each other. Usually the inequality is so small that it may be passed over; but whenever it is noticeable it should not be passed over, but the frames of the spectacles or folders should be made so as to exactly fit the face. It might be thought that this would make the want of symmetry more palpable, but the very reverse is the case. Spectacles with symmetrical frames, when worn by a person who has unsymmetrical features, cause the want of symmetry to be noticeable directly. A few months since I made a pair of spectacles for a distinguished American professor. I corrected the frames of these for a slight want of symmetry in the features, and the professor called upon me shortly afterwards and told me “they were the greatest

luxury he had ever had in his life." All spectacles he had previously worn sprang out of position when he walked ; and as the lenses were very deep concaves, the centres no longer corresponded with the centres of his eyes. "Now," he said, "for the first time I am unconscious of the fact that I am wearing spectacles."

#### SPECTACLES WITH INACCURATE LENSES.

One great evil results from spectacles being sold by people who are not opticians. The spectacles they sell, being manufactured by grosses to supply the wholesale market, are frequently, through the carelessness of the workmen, glazed *with lenses which differ in focus*. The effect of wearing such spectacles soon becomes painful, and if persisted in, results in serious mischief to the eyesight of the wearer. I have known of many instances, but one very interesting and peculiar case I recollect well.

A minister came to me for a valuable astronomical instrument he had been commissioned to purchase by a friend. When he had done this he asked me if I would examine and test his eyes. I found the left eye inflamed, but both eyes equal in focus, and very nearly equal in acuteness of vision. On inquiry, I found that whenever he read or wrote the inflamed eye became rapidly worse. I then asked him about his spectacles. He said he had purchased a pair some weeks previously in a country town, and he now recollects that his left eye had troubled him much more since he had worn them. On hearing this I tested the lenses in his spectacles separately, and found *they differed six inches in focus!* As the gentleman had some knowledge of optics, I was able easily to prove this to him ; and upon my doing so he kindly said to me, "Pray accept of this pair of spectacles, Mr. Browning, and keep them in your cabinet of curiosities." I did, and they are in my possession still.

I recommended him to use a little Goulard water to his eye, and to give it all the rest he could. At the same time I furnished him with a pair of spectacles suited to his requirements; those he had purchased, as well as having lenses dissimilar in focus, were much too strong for him.

As he was staying in London for some time, he favoured me by calling soon afterwards to say that in a few days his eye got quite well. Now, in this case he might have consulted a clever medical man, and yet the cause of the mischief might have remained unsuspected and undiscovered. Even in the case of London opticians, where a large stock of good spectacles is kept, it is often thought that any one may attend to a person who requires spectacles. From this cause I have frequently applications from persons who have failed to get suited elsewhere. One case particularly occurs to me. About three months since, late one afternoon, a lady came in who told me she was nearly eighty years old; she said that she had been told by her medical adviser, or a medical friend, to go to one of the largest opticians in town for a pair of spectacles; that she had just been to them, and that they had assured her that they could give her no spectacles which would be of any use to her, and that she must never expect to read again. This had grieved and alarmed her. In less than a quarter of an hour I had suited her with a pair of spectacles, with which she could read the small type of a daily newspaper almost as quickly as I could read it myself.

At the risk of repeating myself, I must here say that as a rule the whole of the low-class spectacles, sold at prices varying in price from 1*s.* to 2*s.* 6*d.* per pair, have *inaccurate lenses* in this sense, that the centres of the lenses—that is, the thickest part of a convex or magnifying lens which is used to correct old-sight, or the thinnest part of a concave or diminishing lens which is necessary to correct short-sight—*is never in the centre of the oval frame, where it should*

be so as to come opposite to the pupil of the eye when worn.

Now, it is well known that squinting in children can frequently be cured, under medical advice, by giving them spectacles to wear in which the centres of the glasses are wider than the centres of the eyes. This causes the wearer to turn the eyes outwards ; and eventually the eyes, when the spectacles are taken off, remain in the right direction.

A similar action is exerted in all cases where the lenses are out of centre, as I have described ; and though the eyes are not turned, yet the vision is greatly impaired by their continued use. *Such spectacles are disastrous when they are not required.*

#### FRANKLIN'S SPECTACLES.

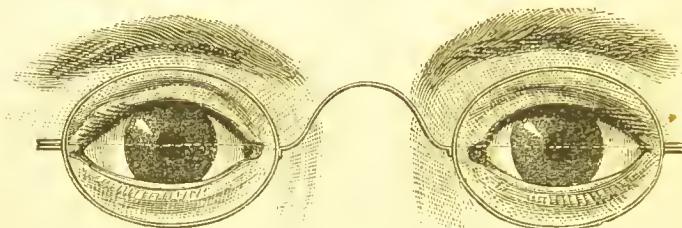


Fig. 68.—Franklin's Spectacles.

It is curious that Franklin's spectacles (Fig. 68) are not in more general use. They are spectacles in which the lenses are divided horizontally in the centre, the upper and lower halves of the lenses being of different strength.

There are many cases in which these spectacles would be found highly useful. For instance, where a person is long-sighted for all distances, that is, can neither see objects at a distance nor close, except through convex lenses, yet requires less powerful lenses for a distance than for a close object. In such a case the upper halves of the lenses require to be weaker than the lower halves.

Also, in short-sighted cases, where it is generally the

case, deeper concave glasses are required for objects at a distance than for reading or writing.

And again, for cases of short-sighted persons who have become long-sighted for close objects only, and who require concave glasses for a distance and convex glasses to read and write with.

In all such cases, spectacles with divided lenses can be used with great advantage, particularly when travelling, as one pair of spectacles which may always be worn will answer for all purposes.

To artists especially, whether portrait or landscape painters, I would strongly recommend such spectacles, because they will enable them to see the object they are drawing, and the drawing itself, equally well.

All the artists I have made them for have been delighted with them.

#### ARTISTS' SPECTACLES.

It is a well-known fact that the work done by an artist is frequently of less value after he has reached a certain age. This, in my opinion, is often caused by failing eyesight. Spectacles would, in many cases, restore the full power of vision ; but spectacles of ordinary construction might be almost useless. Under the head of Franklin's Spectacles, I have briefly described the kind of spectacles most generally useful, but nearly every case requires special treatment. Some artists should have spectacles which they can look over when they wish to see objects at a distance ; others need frames made so that they look through the lenses at distant objects, and under the spectacles at their own drawing (Figs. 24 and 25, p. 42).

A well-known landscape artist, who came to me for reading spectacles, fortunately mentioned casually in conversation that he had been compelled to give up painting large pictures because he had been unable to get any

spectacles with which he could see to paint them. In a few minutes I fitted up glasses with which he could see well a picture 6 feet by 4 feet, placed at several feet from him. He at once said he should resume painting large pictures.

#### HOW TO PUT ON SPECTACLES OR SPRING-FOLDERS.

It might seem unnecessary to give instructions over such a simple matter as this, but experience has taught me that a great many persons put on their spectacles in such a way that they actually injure their sight with them.

Spectacles for reading, drawing, or doing needlework should be worn low down on the nose, and so should spring-folders. They assist the vision more when worn in this manner without putting so much strain on the eyes : the wearer is also able to look *over* them at distant objects. When worn to correct old-sight, that is, indistinct vision of near objects, they should always be taken off when moving about. It is dangerous to go down steps, alight from a carriage, or get out of a train with them on, as refraction causes objects to look higher than they are when seen through them.

Short-sighted persons should wear their spectacles (which should have a low bridge) well up in front of the eyes, and well away from them, so as to be quite clear of the eye-lashes.

Both with spectacles and folders great care should be taken to put them on evenly, straight across the face, with the centres of the glasses opposite to the centres or pupils of the eyes. Most persons put them on with the glass for the right eye lowest through holding them principally with the right hand. This remark applies more particularly to spring-folders, which are often adjusted on the nose with the aid of the right hand only. The cord by which the folders are suspended is also attached to the rim of the

right eye-glass, and gets occasionally pulled down a little. The result is that the right eye-glass is frequently from a quarter to half an inch lower down on the face than the left eye-glass, as shown in the engraving (Fig. 69), and this puts a strain on both eyes. Persons who wish to avoid this error should put on their eye-glasses in front of a



Fig. 69.—Wearing Folders at an angle.

mirror, and adjust them correctly. When they have no mirror at hand they should put them on by using both hands and with a slight tendency to place *the glass for the left eye the lowest*. If this precaution be taken it will generally be found that the glasses will really be set symmetrically on the face as they should be.

#### THE CARE OF SPECTACLES.

It seems never to occur to most people that spectacles require taking care of. They are laid down anywhere, and the glasses get scratched, or they are let fall and the

frames bent out of all shape; then they are roughly straightened and put on again. Strangely enough, when they are worn greatly distorted in shape for some length of time the wearer cannot bear to look through a pair of spectacles of symmetrical form. Until they lose or break the old spectacles past mending, though they are ashamed of their shabby and unsightly appearance, and annoyed at the difficulty they experience in getting them to hold on the face, they will not bear the strain on their eyes of wearing a new pair.

Spectacles and spring-folders should be kept in good shape, and opticians should be ready to set them right for their customers from time to time, free of charge, unless some new parts or repairs are required. Gold spectacles can be kept in shape best, as from the great ductility of the metal they can be bent any number of times without breaking. Gold spectacles can also be repaired easier and stronger than any others. The broken parts of steel spectacles are soldered together with brass. The broken parts of gold spectacles ought to be soldered with gold, and become as strong as the other parts of the frames.

Spectacle lenses should be kept clean by wiping them with a soft, well-worn cambric handkerchief or a piece of soft wash-leather. A silk handkerchief, so often recommended, is not good for this purpose, as it makes the glasses electrical and causes the dust to adhere to them.

Both spectacles and folders should be protected by being carried and kept in rigid cases. The flat snap-catch cases, generally used for gold spectacles and folders, are the best; the frog-mouth are next in usefulness, and the soft cases with a flap and tuck are the worst, as under very slight pressure they bend, and the lenses or frames are broken.

### SINGLE EYE-GLASSES.

Wearing a single eye-glass has happily of late become less common than it used to be, but it should be confined to those who are blind with one eye. I need say nothing respecting the unpleasant expression given to the face caused by the contortion of the features, which is made to keep the eye-glass in position. This is a small evil compared to the injury done to the eyesight by working one eye at the expense of the other.

Those who wear a single eyeglass soon acquire a habit of seeing with the eye only on which it is worn. The vision of the other eye is suppressed ; that is, the image which is formed on the retina remains unseen—a convincing proof that people do not see with their eyes, but with their brains. Suppressing the vision of the eye is almost as hurtful as straining the vision. The muscles of the eye that remain unused wither and lose their power, and the sight of the eye is rapidly impaired. Yet even in such cases as this, by the use of proper lenses the sight may be to a great extent regained.

### INVISIBLE SPECTACLES.

Invisible spectacles or folders have two advantages : they are of the lightest construction that can be made to act efficiently, and the lenses cannot come out of the frames because the frames are smaller than the lenses, being let into the glasses, and thus rendered invisible to any one in front of those who wear them ; but as they are so slight, they should only be worn of the best material and workmanship. And here I must warn my readers against confounding these invisible spectacles and folders with the so-called *frameless* spectacles and folders. As now generally made and supplied, these are a disgrace to the optician's art. The springs, sides, and loops in these wretched things are

riveted directly on to the glasses, while the glasses are frequently twice as thick on one side as they are on the other. This causes them to act as prisms, twisting the eyes, and having a tendency to produce double vision.

The price charged for these contrivances is very low, and yet they are most expensive to wear, for the glasses crack across, and drop in halves just where the metal is riveted on to them.

#### **HOW TO BLIND YOURSELF.**

At the risk of being misunderstood I must express my surprise that so many persons exercise their utmost economy in their spectacles at the expense of their eyesight. I fear I shall scarcely be believed when I say that I have seen a gentleman reading his newspaper, day after day, in a railway carriage, by holding less than half a single lens which had belonged to a pair of frameless folders up to one of his eyes between his finger and thumb. I give an illustration of this optical instrument of torture (Fig. 70). Let any one try to

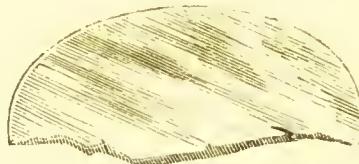


Fig. 70.

read with a small piece of lens, held in one hand in a railway carriage in motion in the manner I have described, to realize my meaning. When the spectacles or folders are fitted properly to the face the lenses and the eyes move together, and those who read in a train with spectacles experience no more difficulty in reading with them than those do who are able to read without them. But when reading with a lens held in the hand, the arm and hand are jerked in one direction, and the head and eye in another, and thus the motion of the print before the sight

is greatly increased. Move any lens before the eye while looking at an object through it, and the object will have an apparent motion given to it directly.

While many persons exercise such unwise economy as I have referred to, there is, I am aware, a large minority, and I have reason to believe an increasing one, who are anxious to use only the best spectacles they can obtain, exactly suited to their case. For the guidance of such as these I have written this book.

I continually hear the remark, "My eyesight was good all my life until I had to take to spectacles, but since I have used them my sight has failed very fast." In almost every instance, on inquiry, I have traced the impairment of vision to the use of improper spectacles. I sincerely trust that the perusal of this little book may prevent many from injuring their sight in a similar manner.

#### POPULAR KNOWLEDGE ABOUT THE EYES.

It is such a pity that people think that they know anything about their eyes. The character of their knowledge I can illustrate best by an anecdote.

On one occasion, when I attended a great rehearsal by Mr. John Hullah at Exeter Hall, everything went well until the chorus had to sing "Rule Britannia." They had not gone through many bars before Hullah rapped on his desk loudly with his baton, and cried out, "Stop, stop! You all know this, I see; but you all know it wrong!"

People who are very short-sighted are, as a rule, under the impression that they ought to read without spectacles, but that it is indispensable they should have strong spectacles for use out of doors; yet, if the distance at which they read small print is much under ten inches, it is imperative they should have spectacles to read with, or they risk their eyes going seriously wrong in some way, such as squinting, double vision, posterior-staphyloma or haemorrhage. In some

instances the retina is actually torn off by the strain put upon the eyes in reading continuously without spectacles. Indeed I have known more instances of the sight breaking down from short-sighted people reading without spectacles than from all other sources put together ; and this urgent warning I now give at the request of a lady who had almost lost her sight when she came to me, from this cause.

Squinting is very commonly a result of neglected shortsight. The tendency is also to use one eye only, which leads to all kinds of trouble.

#### LADIES' VEILS.

The question has frequently been asked me, "Are ladies right in wearing veils, or do they injure their sight by doing so ?" Looking through fine net-work is undoubtedly teasing to the sight, and therefore it would seem to follow that veils must be injurious. But it should be borne in mind that veils tend to subdue excessive light in summer, and shield the eyes from the very bleak east winds in winter ; they also protect the eyes against insects, dust, or any other foreign matter getting into them : for these reasons I consider that ladies are right in wearing them. Let it be understood, however, that the veil should be fine plain *black* net—nothing more ; beaded and spotted or worked veils have much to answer for in injuring the eyesight.

A lady who was wearing a spotted veil having called on an American oculist, he said to her, "Madam, I should be sorry to say a word against that veil you are wearing, because I reckon every spot on that veil ought to be worth five dollars to me."

White, light-coloured, or spotted veils should therefore be most carefully avoided.

**INFLAMMATION OF THE EYES.**

I am frequently asked, "What is the best remedy for slight inflammation in the eyes?" I prefer to quote the advice of a medical friend, Dr. Walters, who says:—

"Where the eyes are sore from exposure to cold wind or bright sun, a safer lotion than Goulard water is one containing two grains of sulphate of zinc in an ounce of water. I should, however, strongly advise those who cannot distinguish between the different kinds of sore eyes to content themselves with still simpler modes of treatment. The eye is a very sensitive organ, and easily damaged by haphazard treatment. If particles of grit enter the eye during a ride, they should be promptly removed with a soft clean handkerchief. For this purpose it may be necessary to evert the lids, a simple manœuvre easily learnt from any medical man. If at the end of the ride the eye is still sore, rest both eyes, and apply to the injured one a folded handkerchief kept saturated with cold water, which may be tied on and worn all night. If next day the eye is painful and sensitive to light, bathe frequently with hot water until it is easier, and then apply the cold-water compress as before. This will be sufficient to cure slight cases, and in more serious ones it is safer to have early medical advice."

**FATIGUE OF THE EYES.**

When the eyes have been used for a long time by artificial light and become fatigued, it is a useful plan to have at hand a lotion composed of rose or elder-flower water, two ounces; wine of opium, half a drachm; French brandy, one drachm. Mix, and occasionally bathe the eye with a fine piece of sponge. The grateful sensation of relief will be at once evident. It will allay inflammation and preserve the sight. The eyes should be closed while they are being bathed, but a small amount of the lotion entering the eye will be beneficial.

**THE CARE OF THE EYES WHEN RIDING,  
DRIVING, OR CYCLING.**

The following chapter is the result of a conversation with my friend Mr. J. B. Marsh. This gentleman, being an expert shorthand writer, took full notes of all I said, and then kindly placed them at my disposal.

People who ride, drive, or cycle should wear a pair of folders with large glasses, even those who are not in the habit of wearing spectacles, to keep the wind, the dust, and insects out of their eyes. If the light is very bright the glasses should be slightly tinted. This is a most useful precaution when riding over chalk roads, such as those in the south of London, and in Kent generally. If there is no defect in the sight, then the folders should have plain parallel glasses ; if short-sighted, then the glasses should be slightly concave.

Not a few have come to me suffering from the effects of insects, dust, or the minute particles of hard substances being blown into their eyes. The intrusive matter sets up irritation and slight inflammation. Small flies which inflict stings create a most injurious effect. Very frequently a fly creates a serious danger if it gets into the eye in particular circumstances. I was once riding down a very steep hill in Kent, between Titsey and Westerham, and a sharp piece of flint was blown into my eye. The pain was so great that I could not see with the injured eye, and the other watered from sympathy, so that I was practically blind and quite helpless. Upon another occasion I was riding down an almost unridable road from the Saltbox near Westerham ; there were rough lumps of rock jutting up, when two little green flies got into one of my eyes, and three flies into the other ; this made me quite blind for a time, and I was riding on a road which was nearly as steep as the roof of a house ; a friend who was with me came to my assistance.

If at that time I had had my folders on, the pain I suffered and the danger I got into would have been avoided altogether.

Upon one other occasion a big fly struck me in the centre of the eye-ball of one eye, and I was made completely blind for a few seconds. But folders are not only a protection against flies and hard particles of matter; they also afford complete protection against high winds. A strong east wind, for instance, acts very injuriously upon the eyes unless they are protected. It is quite absurd for people to wrap up their throats while the membranes of their eyes—which are much more sensitive than any other portion of the body—are left altogether unprotected. The use of folders should be encouraged by those who ride frequently, and in all kinds of weather.

It is a mistake to wear folders of too dark a tint. A true neutral tint, an absolute grey, something between black and white, is the most proper and most useful to wear, because the colours of all objects can be seen through these unchanged.

The common fault among short-sighted persons is to use one pair of spectacles only for reading, working, and for distance. When this is done the eyes are strained at nearly all distances; they have difficulty in focussing on near objects because the spectacles are too strong; while there is difficulty in focussing on distant objects because the lenses are too weak. In many cases short-sighted persons will only put on a pair of spectacles or folders when they actually require them to enable them to see at a distance at all.

When riding, spectacles or folders should be worn, not down on the nose as in reading, but well up in front of the eyes, taking care, however, that the glasses do not touch the eyelashes.

Various objections have been urged against riding in spectacles, but I have only been able to find one practical

objection—that is, rain will cling to the glasses and prevent the rider from seeing clearly. Yet I have often ridden in folders through rain, and I know many others who do so. Short-sighted riders would, I believe, always feel safer with their spectacles on than without them; and though I am not short-sighted myself, I find it pleasanter to catch the rain on the lenses of my folders, than to let it drive into my eyes.

#### COMPLAINTS OF THE EYE.

It is not my province to treat of diseases of the eye, but a few words on the subject may be both interesting and under some circumstances useful, as they may enable persons to distinguish between bad sight produced by disease and defective vision caused only by the use of improper lenses, or by the want of spectacles.

#### SQUINTING.

When a cast is visible in the eye of a young child an oculist or skilful ophthalmic optician should at once be consulted, as in most cases the unsightly defect may, if taken in hand immediately, be cured without an operation, by simply wearing a pair of spectacles suitably adapted to the case for a few months.

#### CATARACT.

This distressing complaint is caused by the crystalline lens of the eye becoming opaque, like white china. The effect is to offer a mechanical obstruction to the sight. Fortunately the complaint is curable by the operation of removing the crystalline lens. My advice has been for many years *never to have one eye operated on while there is fairly good vision left with the other.* Where the sufferer from cataract is at the same time short-sighted the optician can be of very little service: but where the cataract comes on

in advancing years and is accompanied by presbyopia, or old-sight, the optician may afford so much relief that the operation may be almost indefinitely postponed, or altogether avoided.

It is a popular mistake to suppose that every one who has cataract must, unless operated on, go blind. I have many correspondents who have suffered from cataract for years without becoming appreciably worse.

#### GLAUCOMA.

In this affection of the eye the patient has only a limited field of vision—a few lines, or in extreme cases only a few words, will be visible in the page of print. This is a grave complaint, as unless attended to it may run on to blindness. Immediate attention should be obtained from a skilful surgeon-oculist.

#### HAY FEVER.

I have frequently found some of the most distressing symptoms of hay fever greatly relieved by wearing a pair of moderately dark neutral-tinted folders, whenever the sufferer is in a strong light. The involuntary weeping ceases, and the sneezing is mitigated, while the headache disappears. Bright light, to a sufferer from hay fever, appears to act as an irritant to the eyes, as pepper would to the eyes of a strong person in good health.

#### ON THE RAPID INCREASE OF SHORT-SIGHT AND OTHER FORMS OF DEFECTIVE VISION.

The attention I have, for many years, given to subjects connected with vision has made me acquainted with the fact generally that short-sight is alarmingly on the increase.

Short-sight is hereditary, and is transmitted from parents to their children, and in this connection I may say that I have supplied spectacles to four generations of one family,

for short-sight, within a few weeks, while for three generations I have many times supplied them. The evidence of transmission is in such cases undenialable. But, besides those cases which are thus unfortunately and inevitably increasing, we are manufacturing short-sighted people on a wholesale scale.

Some seventy years since, in three regiments of Guards, tested for defective vision, short-sight was almost entirely unknown ; and only last year, an examination of the children of a Board School in South London showed that more than one-fourth of the children had defective vision, and one in each ten was short-sighted.

In every other respect but that of vision our race is improving. The stature of our men is increasing, and our athletes even out-do the picked men of savage races, and even the feats that were performed in rowing, running, and swimming, by their forefathers a few years ago, but few of them could bear any comparison with a savage as regards keenness of vision at a distance.

The late Dr. Mann stated that Mr. Francis Cobb recollects an instance, when he was in Africa, of a friend directing attention to a small speck that he saw at a great distance, which he thought was moving. On pointing this out to some natives who were with them, they at once pronounced it to be the missionary, who was on foot, and his wife, who was on horseback, and mentioned who they were. Having obtained a good binocular, Mr. Cobb was able to see that the natives were correct—that there were two persons—but he could not, even with the binocular, tell one was riding, nor who they were.

#### HOW TO DIMINISH SHORT-SIGHT.

Short-sight is due to two causes :—concentrating our attention almost exclusively on near objects—as in reading, drawing, needlework, etc. ; and never using our eyes for

any length of time in examining objects at a distance. Small-type school-books are most destructive of the sight, especially for very young children.

To prevent the rapid increase of short-sight, school-books should be printed in large type, and the earliest books should be in very large type, of the size used in printing the texts hung in the waiting-rooms at railway stations.

Lessons should be given on the blackboard, and pupils should be encouraged to describe objects at a distance.

Parents should choose for their children who show a tendency to short-sightedness out-door occupations and amusements.

Prizes should be given to those who can accurately describe objects with which they are unacquainted, at the greatest distance.

It would be difficult to overrate the value of this subject and its treatment. People who are short-sighted cannot observe natural objects at a distance; their attention is confined to their immediate surroundings. They must, therefore, be deficient in many kinds of knowledge compared with those who are more favourably circumstanced as regards vision.

It is not possible, without risking great injury to their eyesight, to give short-sighted persons quite the same clear vision for a distance that is enjoyed by persons who have normal vision, and *all those persons who are very short-sighted are on the threshold of disease of the eye.*

It cannot be too well understood that short-sight, when it is not inherited, is produced by looking intently and continuously at *near* objects. Many persons pass their lives without looking for any length of time at objects a hundred yards off from them.

The obvious remedy is to exercise the eyes by looking frequently at objects which are at a considerable distance.

The extent to which short-sighted persons go on increasing their calamity is almost beyond belief. A great number

of them wear only a single pair of spectacles, with which they cannot see well either near or distant objects, instead of having one pair of spectacles to read with and another for walking in, that is, for general out-door use, as they should have. Others, again, content with the fact that they can see any object plainly if they hold it within five or six inches from the face, never wear any kind of glasses, but hold up occasionally a single eye-glass or pair of spring-folders, far too strong for them, when they require to see any distance. Such a course of proceeding is usually attended with disastrous results to the eyesight. I have known of two cases recently of persons who have acted in this manner, who have almost totally destroyed their vision.

As an example of the manner in which short-sight is frequently dealt with, I may name a case, by no means a solitary one.

A gentleman came to me suffering from inflammation in the eyes—he could scarcely look at me—he was wearing short-sighted spectacles. I applied a simple test, and found that he required barely three dioptrics to correct his short sight. On testing the spectacles that he was wearing when he came in, I found them to be of the power of over four dioptrics. I asked him where he got them from. He mentioned the name of an optician in one of the leading London thoroughfares. “How did he test your eyes?” I inquired. The reply was: “He gave me a trayful of spectacles, and told me to put them on one after the other until I could see the ironwork of the weathercock on the spire of a church at a long distance, probably about a quarter of a mile off; and when I had found a pair with which I could do this, he told me they would suit me, and I was to wear them constantly.”

Now, short of putting this gentleman’s eyes out with hot irons, it would have been difficult for the optician to do anything more likely to deprive him of sight.

It really appears almost impossible to combat the erroneous notion that short-sight is strong sight, although the simplest observation of cases around us would show any observing person that short-sight is nearly always weak sight; at any rate it is obvious that it is thoroughly unnatural sight, for short-sight will not even "guard its master against a post," while the proper use of the eyes is to enable us to see objects as far off from us as possible.

It would require more space than I have at my disposal to indicate the incalculable mischief done in cases of short-sight by persons who know next to nothing about their own eyes purchasing spectacles from those who know still less. Unfortunately, there are few opticians indeed who are competent to assist the vision in cases of short-sight. Until they understand both the eye and optics better, and give their advice as a surgeon or physician would, with a single-minded desire to preserve the eyesight of those who apply to them for assistance, without regard to the profit that can be made by selling their spectacles, defective vision must increase.



## INDEX.

ACHROMATIC telescope, how to use, 25  
 Analyzing colours, 23  
 Aqueous or vitreous humour, 17  
 Arab proverb, 15  
 Art of seeing, the, 15  
 Artists, why many over-colour their pictures, 23  
 Artists' frames, 41, 42  
 Astigmatism defined, 76; how to correct it, 76-80; irregular form of, 81  
 Astronomers look for minute stars or faint objects sideways, 19

BARTLETT, Rev. Lionel, extract from a letter to the author, 79, 80  
 Bed, how to be placed by persons with weak eyes, 29  
 Berlin wool, experiment with skeins of, to test sense of colour, 21  
 Billiard-players understand the advantages of top-lighting, 28  
 Blood distinguishable by use of a miniature spectroscope from other liquids similar in colour, 23, 24  
 Blue glasses the best and most beneficial, 32, 33  
 Blue, its effect on grey, 22  
 "Bradshaw-blind," apt designation of a correspondent, 36  
 Brazilian pebbles, 50

CANE window-blinds preferable to wire-gauze, 31  
 Cannon-street murder, a man wrongly arrested on suspicion, 23; proves an alibi and explains that the supposed blood-spots on his clothes were *red shellac* varnish, 24  
 Carter, Mr. Brudenell, his book on "Good and Bad Sight" quoted, 59  
 Cases for spectacles, 98  
 Cataract, 106  
 Charing Cross Railway Station, height of the clock at, 43  
 Childbirth, its temporary effect on the sight in women, 54  
 Children's eyes, care of, 31, 32  
 Choroid coat, the, 17

Ciliary muscle, the, 17; a ring of muscular fibre, 17  
 Cold tea recommended for sluicing or bathing the eyes when slightly inflamed, 31  
 Cold water, sluicing the eyes with, 31  
 Colour, a sensation in the brain caused by light, 20  
 Colour-blindness, 20; tests for, 21  
 Coloured glasses, use of, 32-34  
 Complaints of the eye, 106  
 Complementary colours, 21  
 Cornea, the, or central portion of the eye, 16; condition of cylindricity in (see also *Astigmatism*), 76, 81  
 Crystalline lens, popularly supposed to be the pupil of the eye, 16, 17  
 Crystals used for spectacle lenses, 50-52; should be tested by the polariscope, 50

DAVIES, Mr. G., author of "Practical Microscopy," on the danger of using the microscope in a vertical position, 25  
 Diagram of the eye, 17  
 Dioptric system of indicating the power of lenses, 56  
 Drawings and photographs compared, 15, 16

EYE, description of the, 16, 17; believed to take a photograph of objects looked at intently, 19; complaints of, 106  
 Eyeball, the, 17  
 Eye-glass, single, to be avoided, 43; should be confined to those who are blind with one eye, 99  
 Eye-sight, how to preserve, 24  
 Eyes, general care of the, 30; should be kept cool, 31; inflammation of, 103; care of, when riding, driving, or cycling, 104

FIRELIGHT, danger of reading by, 29  
 Focussing power, deficiency or absence of, 37  
 Folders and spectacles compared, 81-83; how to put on, 96, 97

Folders, a new form of, 83  
 Franklin's spectacles, 94

GAASSIOT, M., his *carte-blanche* commission to the author for a powerful and perfect spectroscope, 59  
*Gentleman's Magazine* quoted, 26

Glaucoma, 107  
 Gold spectacles, why best, 98  
 Gorham, Mr., inventor of colour-top, 22; diagrams by, *ib.*  
 Goulard water, 31, 93  
 Green, its effect on grey, 22

HAVILAND, Dr. Alfred, practical suggestion of, in regard to seaside houses, 33  
 Hay fever, 107  
 Hypermetropia, or long-sight, 61

INFANTS' and children's eyes, care of, 31, 32  
 Inflammation of the eyes, how to relieve, 31, 103  
 Invisible spectacles, 99  
 Iris, or coloured portion of the eye, 16

KEYHOLE of a door compared to pupil of the eye, 17  
 Knowledge, correspondence in, 50

LADIES' veils, when too thick, injurious to the sight, 31  
 Lamp, the best for reading, 26  
 Lamplight, reading by, 25-30  
 Landscape, a photograph of, 15  
 Large and small type, 30  
 Lenses, 50, 51, 56, 57, 59, 60; how to keep clean, 98  
 Lettsom, Mr. W. G., specimens of crystal communicated by, 51, 52  
 Light, a few words about, 20; the cause of colour, *ib.*  
 "London smoke," or neutral-tint glasses, the pleasantest to wear, 32, 33  
 Long-sight, 54, 61  
 Low-class spectacles, defect of, 92, 93

MICROSCOPES, power of, 16; habit of using, 24; how to fix, when using, 24  
 Muscle, ciliary, 17; a ring of muscular fibre, 17  
 Myopia, or short-sight, produced by reading in an imperfect light, 32, 62-68

NEEDLEWORK, dark, should not be done by artificial light, 30  
 Newtonian reflecting telescope, its superiority to the achromatic telescope, 25

OCULISTS, 16  
 Old-sight, 53-55  
 Optician, art of the, 16  
 Opticians, numbers of their lenses un-systematic and misleading, 56

Optometer, 49; the only good test for unequal vision, 87

PANTASCOPIE frames, 41  
 Pebble lenses, 59  
 Pepper's Ghost, 19  
 Periscope lenses not good, 56, 57  
 Photograph of a landscape, 15; of a statue, 15; more solid than a drawing, *ib.*; taken by the eye when looking at an object intently, 19  
 Presbyopia, or old-sight, 53-55  
 Pupil frames, 41  
 Pupil of the eye, 16; an opening which admits light into the crystalline lens, 16

QUACKERY in spectacles, practised by *soi-disant* opticians, 35, 45  
 Quartz, 50, 59

RABBITS, experiment on the retina of, 19  
 Reading by lamplight, 25-30; by fire-light, 29; in bed, *ib.*; in railway carriages, 30; best distance for, 36, 55  
 Red, its effect on grey, 22  
 Retina, the, 17, 19; a portion of, not sensitive to light, 19; duration of impressions on, *ib.*; danger of forming a permanent image on, 25  
 Riding, driving, or cycling, care of eyes when, 104-106

SCHOOLROOMS often deficiently lighted, 32  
 Seaside glare should be moderated by using coloured-glass spectacles, 33  
 Shapes of spectacle-frames, 42  
 Shellac varnish, red, its resemblance in colour to blood, 24; used by a hat-maker, *ib.*  
 Short-sight, how produced, 32, 62-68; on the rapid increase of, 107-111  
 Shot-proof spectacles, 52, 53  
 Sight varies with health, 54; how to test the, 70-76  
 Small type in books to be avoided, 30  
 Spectacle-cases, the best sort, 98  
 Spectacle quacks, 35, 45  
 Spectacles, recent great improvements in, 16; use of coloured, 32-34; when required, 34-36; a luxury, not a nuisance, to those who need them, 36; how to wear, 37, 60, 61, 65, 66; how to use for reading, 37; should fit the face, 38; width of, 38-41; various forms of, 41; and folders, compared, 81-83; with inaccurate lenses, 92, 94; how to put on, 96, 97; the care of, 97, 98  
 Spectroscope, the, 16; description of one contrived by the author, 21, 23, 24  
 Spirit-lamp, experiment with, on colours, 20

Squinting, cure of, 94, 106  
 Stained glass, colours of, 22  
 Statue, a good photograph of, 15  
 Stevenson, Mr., of the Royal Microscopical Society, 89

TEA, cold, recommended for bathing the eyes to relieve slight inflammation, 31  
 Telescopes, power of, 16; habit of using, 25; reflecting and achromatic compared, 25  
 Tepid water, for sluicing inflamed eyes, 31  
 Test letters for astigmatism, 76, 77  
 Test types, 32, 68-70  
 Tinted writing-paper beneficial to the eyes, 30; what colours should be chosen, *ib.*  
 Trees, why they are green, 20  
 Turner, Joseph Mallord William, anecdote of, 15  
 Type-writer, use of, recommended to persons with impaired vision, 30, 31

UNEQUAL vision, 87-91  
 VARNISH, red shellac, its resemblance in colour to blood, 24; used by a hat-maker, *ib.*  
 Veils, thick, injurious to the sight, 31  
 Violet glasses, 33  
 Vitreous or aqueous humour, 17

WALKING, spectacles for, 65, 66  
 Water, cold or tepid, for sluicing the eyes, 31  
 Williams, Mr. Mattieu, article by, in the *Gentleman's Magazine*, quoted, 26-28  
 Window-blinds, light cane preferable to wire-ganze, 31  
 Wire-gauze window-blinds ugly, dusty, and injurious to the sight, 31  
 Writing-paper, tinted, 30

YELLOW, its effect on grey, 22  
 Yellow light, its effect on bright colours, 20

THE END.





BROWNING'S NEW METHOD  
OR

Suiting Residents in the Country with Spectacles or Folders  
by Correspondence.

FULL PARTICULARS SENT POST FREE.

JOHN BROWNING,

*Optical and Physical Instrument Maker to Her  
Majesty's Government,*

35, Alfred Place West, South Kensington, S.W.,  
and 63, Strand, London, W.C.

**Testimonials.**

*Extracts from Letters received from Country Residents who have been  
suited with Spectacles by Browning's New Method.*

Uxbridge, 2/6/88.

Dr. G.—presents his compliments to Messrs. BROWNING, and begs to say the Folders have come to hand safely, and are very satisfactory.

Darlington, July 19, 1888.

DEAR SIR,—I beg to acknowledge safe arrival of Spectacles. They prove themselves everything I could desire, and I am deeply indebted to you for the trouble you have taken in suiting me.

Yours truly, (signed) H. G. E.

Glasgow, July 12, 1888.

DEAR SIR,—I enclose postal orders for 25s., the balance due for Gold Folders received yesterday. I have to thank you for your prompt attention, and have much pleasure in informing you that Mrs. M.—says she is delighted with them. They fit admirably, and give her a range of vision such as she has not had for years.

Yours truly, (signed) J. C. M.

Bournemouth, August 23, 1888.

DEAR SIR,—I am very much obliged for your prompt attention, and also for the Spectacles, which duly arrived yesterday. They are a perfect success, and my wife finds them most soft and comfortable to the vision, and will not fail to recommend every one we know, whose sight requires attention, to place themselves in your hands. Yours faithfully, (signed) G. J., Colonel.

Taunton, September 25, 1888.

DEAR SIR,—After giving the Glasses you made me a somewhat protracted trial in various lights and under a variety of circumstances, I am very glad to be able to give you the most satisfactory account of them. The pair for reading and writing enable me to do both with great comfort, while those for out-door work enable me to perceive objects with far greater distinctness, and therefore answer the purpose entirely.

Very faithfully yours, (signed) C. W. N. C.

Shardlow, October 28, 1888.

Mrs. Z. S. begs to acknowledge the receipt of her Spectacles, which in every way suit her, and are superior to any glasses she has ever had before.

## TESTIMONIALS—continued.

Cleveland House, Hartburn, near Stockton-on-Tees,

August 20, 1886.

DEAR SIR,—For the last ten or twelve years my eyesight has failed me very much; during that time I bought six pairs of spectacles which proved of very little use to me, for my eyes got weaker. Six months ago, I bought two pair of spectacles from you; before buying them I could not read a newspaper with the spectacles I had, but now I am able to read the moderate-size print without them.

Yours faithfully, (signed) HENRY SMITH.

JOHN BROWNING, Esq., 63, Strand, W.C.

From W. D. MASON, Chemist, to Mr. J. BROWNING, London.

253, Cleethorpe Road, Grimsby, September 27, 1886.

DEAR SIR,—I thought perhaps you might wish to know how I liked the gold spectacles. They are simply perfect. In no particular could I desire any improvement. The pebbles are the clearest and most highly polished I have met with, and quite free from the slightest flaw or imperfection of any kind, besides being properly axis-cut. The unequal foci of the two lenses are exactly as ordered, and suit my eyes to a nicety. I can wear them for any length of time with comfort, and, except for the great improvement of vision, could forget I had them on. With thanks for the pains you have taken to fulfil all my requirements.

I am, dear sir, yours truly, (signed) W. D. MASON.

Denmark Cottages, West Hill, Bournemouth, October 7, 1886.

DEAR SIR,—It is with pleasure I again write to say I am still seeing better, with less fatigue and pain, *but worse without the spectacles*. One morning I put them off whilst indoors, and was suddenly called away; but by the time I reached the shop, about ten minutes' walk, I had got a very bad headache, and I had to send back for them, and felt relieved immediately on putting them on, and so proving the benefit.

Thanking you for your attention so kindly given to me and my case,

I beg to remain, respectfully yours, (signed) J. T. VANNER.

J. BROWNING, Esq.

The Eyes of Unequal Focus—a very difficult case.

Belfast, August 18, 1882.

SIR,—I received the Glasses to-day, and have great pleasure in informing you that they suit perfectly.

I am, yours respectfully, (signed) W. M. V.

Bury, Lancashire, November 10, 1882.

DEAR SIR,—Herewith I hand you 5s. 4d. balance of account as per enclosed invoice. No. 16 Glasses suit me very well. I am extremely obliged for the trouble you have taken in suiting me, and as opportunity offers I shall recommend your system to my friends.

Yours faithfully, (signed) F. C.

Mr. JOHN BROWNING.

Penzance, November 27, 1882.

DEAR SIR,—I herewith enclose 6d. balance of Spectacles. Allow me to tender you my grateful thanks for your kind attention, and for the nice cool and soft effect of the Spectacles.

I am, sir, yours truly, (signed) S. M.

JOHN BROWNING, Esq., 63, Strand, London.

From a Physician.

Tredegar, December 20, 1882.

SIR,—The Folders have reached me safely, and suit my patient exceedingly well.

Yours truly, (signed) G. B.

Mr. J. BROWNING, 63, Strand, W.C.

Bedford, February 20, 1883.

DEAR SIR,—Many thanks for the speedy return of Spectacles and the trouble you have taken over them, they are so delightfully cool to the eyes. I have pleasure in enclosing P.O.O. to amount of a/c.

Yours faithfully, (signed) C. S. A.

Mr. J. BROWNING.

Padstow, March 8, 1883.

SIR,—The box containing the Folders safely to hand, with which I am very much pleased; they suit me splendidly. I am, yours very respectfully, (signed) L. W.

To Mr. BROWNING.

## TESTIMONIALS—continued.

To J. BROWNING, Esq.

Walsall, May 28, 1883.

DEAR SIR,—The Spectacles fitted with pebbles cut at right angles to the axis, which you have made for me, suit me admirably. Your method of ascertaining what kind of Spectacles the eye requires is at once ingenious and effective. Accept my thanks. I enclose cheque for the amount of bill.

Yours faithfully, (signed) WM. C.

Folkestone, June 6, 1883.

DEAR SIR,—It affords me much pleasure to inform you that the Spectacles with which you supplied both my wife and self in April last have given us *perfect* satisfaction; they are light, cool, and clear, and, although used every night, have in no measure given fatigue or pained the eye.

I am, yours faithfully, (signed) G. E. T.

JOHN BROWNING, Esq., London,

Dinnet, Aberdeen, June 22, 1883.

DEAR SIR,—The Spectacles are safely to hand, and are a perfect success; not the faintest difference is detectable between the vision of the two eyes; the frames please me much, as they have what all frames should have, a fair strength in arms and bridge. Thanking you very much for your patient kindness,

I remain, very truly yours, (signed) G. D.

J. BROWNING, Esq., 63, Strand, W.C.

Southend, April 27, 1883.

DEAR SIR,—Herewith I return Eyeglasses. The Spectacles having arrived, they give me much pleasure and relief. Thanking you for prompt attention,

I remain, yours faithfully, (signed) G. L., F. M. Soc.

Stoke-on-Trent, October 6, 1883.

DEAR SIR,—I enclose balance due on account of Spectacles. Mrs. P. is delighted with those you have supplied her with, and begs me to thank you for the trouble you have taken.

I am, etc., (signed) F. W. P.

Mr. J. BROWNING.

47, Sloane St., S. W., January 13th.

LORD GERALD FITZGERALD begs to thank Mr. BROWNING for the Spectacles, which answer perfectly.

J. BROWNING, Esq.,

Newport, Fife, March 12, 1884.

DEAR SIR,—I have received my Spectacles, which are very suitable. I have never seen so well with any spectacles I ever had before, and I have worn spectacles for nearly 35 years.

Yours faithfully, (signed) D. B.

### A very difficult case—Extreme Myopia.

Urmston, near Manchester, June 3, 1884.

DEAR SIR,—Spectacles for Mrs. S. safely to hand. We are delighted with them. Please find enclosed 15s. 6d. to balance a/c. Yours truly, (signed) WM. S.

JOHN BROWNING, Esq., London.

Watford, July 28, 1884.

DEAR SIR,—I have great pleasure in adding another testimonial to your profound skill as an optician. The Glasses with which you have supplied me have opened a new world to me.

Yours gratefully, (signed) J. W.

New Malden, October 18, 1884.

DEAR SIR,—I am sure you will be pleased to hear that I am in every way pleased with your Spectacles. After a day or two's wear I found them so perfectly easy, I did not like to take them off. I may add I have tried six or eight pairs before, and never found any to suit me so well.

Yours truly, (signed) F. C. F.

Crouch Hill, N., January 18, 1884.

DEAR SIR,—I am glad to be able to tell you that the Spectacles suit me admirably, and I am very pleased with them; in fact, I do not see how they could be improved in any way.

Mr. BROWNING.

Cambridge, January, 31, 1884.

DEAR SIR,—I have received safely the Spectacles, which give me the greatest pleasure and relief. In case of accident, I should like to have another pair exactly similar.

Yours truly, (signed) A. H. C.

## *TESTIMONIALS—continued.*

Forth, by Lanark, *January 31, 1884.*  
DEAR SIR,—I received the discharged a/c for Spectacles and Folders, and have to acknowledge the patience and courtesy with which you have so perfectly suited my unequal eyes. I am, dear sir, yours faithfully, (signed) Wm. SEMPLE MUIR.

Piccadilly, *December, 1884.*  
MY DEAR SIR,—Now that I have had some days' experience of the Spectacles, I feel I must write and say how well they suit my eyes—already they have improved the left eye—and how much obliged I am for the pains you have taken in the matter.  
Yours very truly, (signed) F. J. H.

J. BROWNING, Esq.

Podamur, Madras, *January 20, 1885.*  
DEAR SIR,—Your letter and Folders arrived safely on the 16th. They suit and fit me to perfection. I beg to thank you very much for the trouble you have taken.  
I am, yours faithfully, (signed) G. R. B.

Bolton, *February 10, 1885.*  
DEAR SIR,—Enclosd P.O.O. for £2, balance for the Glasses. For the first time in my life, I enjoy wearing them. They are so clear and so cool that to read is a pleasure.  
Yours truly, (signed) J. J. W.

Malvern, *March 3, 1885.*  
DEAR SIR,—I enclose 15s., and beg to thank you for the admirable way you have suited my sight. I have never previously worn Glasses with so much comfort.  
Yours very truly, (signed) W. H. M.

Port Elizabeth, Algoa Bay, *October 12, 1885.*  
DEAR SIR,—Packet of Spectacles to hand. I thank you for the same: as regards clearness and distinctness of vision combined with comfort, they are beyond my expectations.

My brother is equally satisfied with his Glasses.

I remain, dear sir, yours faithfully, (slgned) N. Mc. D.

J. BROWNING.

Southend, Essex, *December 19, 1885.*  
DEAR SIR,—I have to acknowledge safe arrival of Spectacles to replace others supplied by you two years ago, and am pleased to learn that I can obtain duplicates so easily by your system of registration, more especially as I suffer from unequal vision, and require glasses specially fitted. Yours faithfully, (signed) G. L.  
J. BROWNING, Esq., 63, Strand.

Iffracombe, *January 21, 1886.*

SIR,—I beg to acknowledge the receipt of Spectacles. I used them last night, and was charmed to find with what ease and comfort they enabled me to read, particularly as I have in vain tried for the last year or two to get Spectacles to suit me.  
Yours truly, (signed) M. G.

Highbury New Park, London, N., *February 11, 1886.*

DEAR SIR,—You will be pleased to know that the Spectacles you made for me have entirely taken away from my eyes the very painful sensations which I had endured constantly for years and which got gradually but distressingly worse. I thank you very much.  
Yours truly, (signed) M. H.

Mr. BROWNING, 63, Strand.

To Mr. J. BROWNING.

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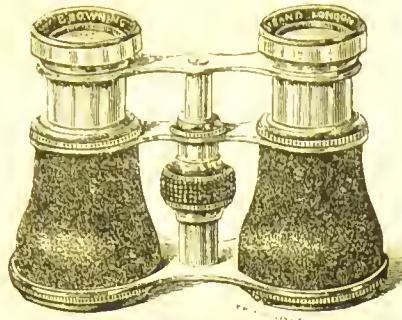
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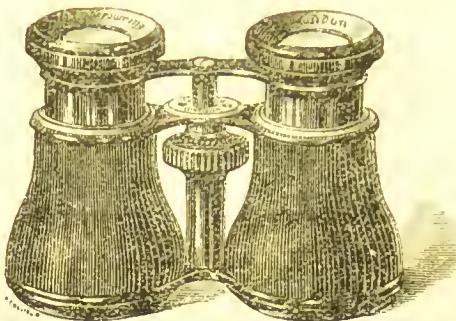
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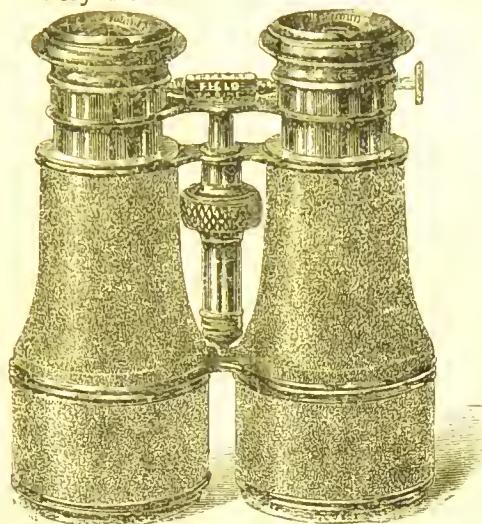
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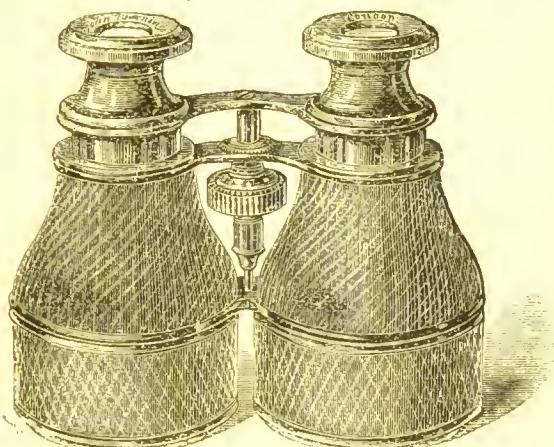
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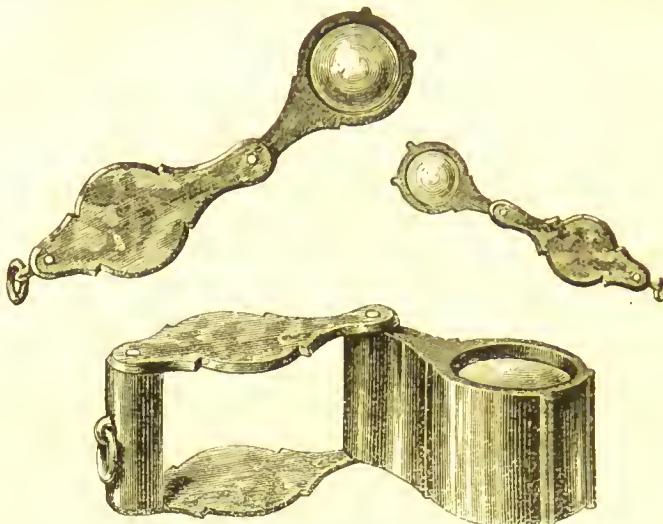
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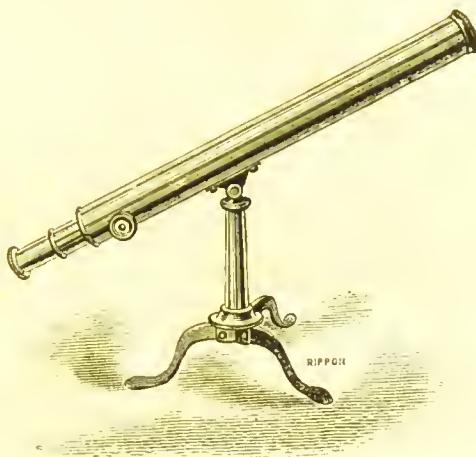
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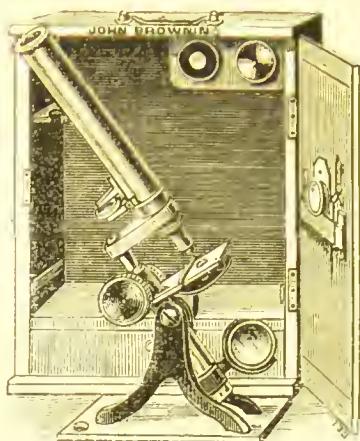
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